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(54) **PLAYBACK DEVICE GROUPING**

(56) **References Cited**

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U.S. PATENT DOCUMENTS

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3,956,591 A 5/1976 Gates, Jr.
4,105,974 A 8/1978 Rogers
(Continued)

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FOREIGN PATENT DOCUMENTS

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CA 2320451 A1 3/2001
CN 1598767 A 3/2005
(Continued)

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OTHER PUBLICATIONS

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(Continued)

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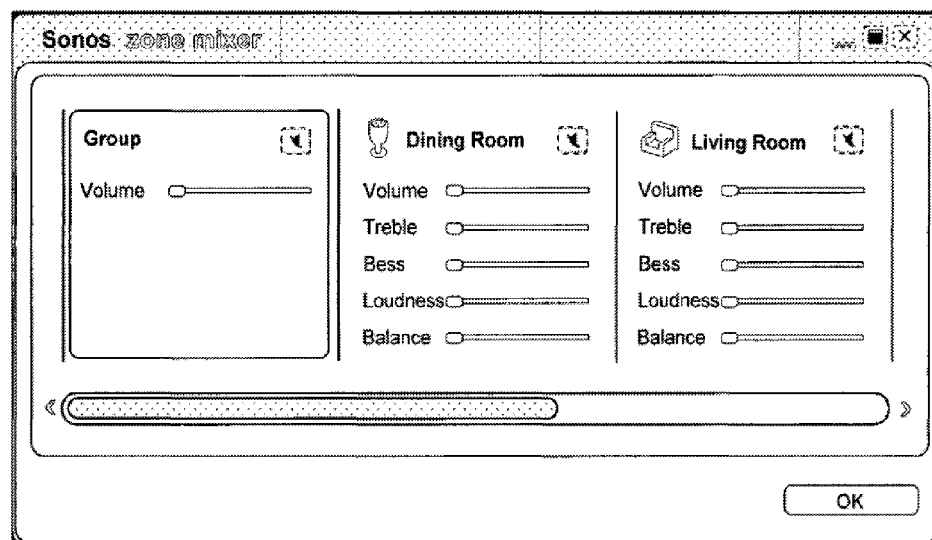
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(57) **ABSTRACT**

In general, user interfaces for controlling a plurality of multimedia players in groups are disclosed. According to one aspect of the present invention, a user interface is provided to allow a user to group some of the players according to a theme or scene, where each of the players is located in a zone. When the scene is activated, the players in the scene react in a synchronized manner. For example, the players in the scene are all caused to play a multimedia source or music in a playlist, wherein the multimedia source may be located anywhere on a network. The user interface is further configured to illustrate graphically a size of a group, the larger the group appears relatively, the more plays there are in the group.

20 Claims, 24 Drawing Sheets



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See application file for complete search history.
- (56) **References Cited**
U.S. PATENT DOCUMENTS
- | | | | |
|-----------|---|---------|-------------------|
| D260,764 | S | 9/1981 | Castagna et al. |
| 4,296,278 | A | 10/1981 | Cullison et al. |
| 4,306,114 | A | 12/1981 | Callahan |
| 4,509,211 | A | 4/1985 | Robbins |
| D279,779 | S | 7/1985 | Taylor |
| 4,530,091 | A | 7/1985 | Crockett |
| 4,696,037 | A | 9/1987 | Fierens |
| 4,701,629 | A | 10/1987 | Citroen |
| 4,712,105 | A | 12/1987 | Koehler |
| D293,671 | S | 1/1988 | Beaumont |
| 4,731,814 | A | 3/1988 | Becker et al. |
| 4,816,989 | A | 3/1989 | Finn et al. |
| 4,824,059 | A | 4/1989 | Butler |
| D301,037 | S | 5/1989 | Matsuda |
| 4,845,751 | A | 7/1989 | Schwab |
| D304,443 | S | 11/1989 | Grinyer et al. |
| D313,023 | S | 12/1990 | Kolenda et al. |
| D313,398 | S | 1/1991 | Gilchrist |
| D313,600 | S | 1/1991 | Weber |
| 4,994,908 | A | 2/1991 | Kuban et al. |
| D320,598 | S | 10/1991 | Auerbach et al. |
| D322,609 | S | 12/1991 | Patton |
| 5,086,385 | A | 2/1992 | Launey et al. |
| D326,450 | S | 5/1992 | Watanabe |
| D327,060 | S | 6/1992 | Wachob et al. |
| 5,151,922 | A | 9/1992 | Weiss |
| 5,153,579 | A | 10/1992 | Fisch et al. |
| D331,388 | S | 12/1992 | Dahnert et al. |
| 5,182,552 | A | 1/1993 | Paynting |
| D333,135 | S | 2/1993 | Wachob et al. |
| 5,185,680 | A | 2/1993 | Kakubo |
| 5,198,603 | A | 3/1993 | Nishikawa et al. |
| 5,237,327 | A | 8/1993 | Saitoh et al. |
| 5,239,458 | A | 8/1993 | Suzuki |
| 5,272,757 | A | 12/1993 | Scotfield et al. |
| 5,299,266 | A | 3/1994 | Lumsden |
| D350,531 | S | 9/1994 | Tsuji |
| D350,962 | S | 9/1994 | Reardon et al. |
| 5,361,381 | A | 11/1994 | Short |
| 5,372,441 | A | 12/1994 | Louis |
| D354,059 | S | 1/1995 | Hendricks |
| D354,751 | S | 1/1995 | Hersh et al. |
| D356,093 | S | 3/1995 | McCauley et al. |
| D356,312 | S | 3/1995 | Althans |
| D357,024 | S | 4/1995 | Tokiyama et al. |
| 5,406,634 | A | 4/1995 | Anderson et al. |
| 5,430,485 | A | 7/1995 | Lankford et al. |
| 5,440,644 | A | 8/1995 | Farinelli et al. |
| D362,446 | S | 9/1995 | Gasiorek et al. |
| 5,457,448 | A | 10/1995 | Totsuka et al. |
| D363,933 | S | 11/1995 | Starck |
| 5,467,342 | A | 11/1995 | Logston et al. |
| D364,877 | S | 12/1995 | Tokiyama et al. |
| D364,878 | S | 12/1995 | Green et al. |
| D365,102 | S | 12/1995 | Gioscia |
| D366,044 | S | 1/1996 | Hara et al. |
| 5,481,251 | A | 1/1996 | Buys et al. |
| 5,491,839 | A | 2/1996 | Schotz |
| 5,515,345 | A | 5/1996 | Barreira et al. |
| 5,533,021 | A | 7/1996 | Branstad et al. |
| D372,716 | S | 8/1996 | Thorne |
| 5,553,147 | A | 9/1996 | Pineau |
| 5,553,222 | A | 9/1996 | Milne et al. |
| 5,553,314 | A | 9/1996 | Grube et al. |
| D377,651 | S | 1/1997 | Biasotti et al. |
| 5,596,696 | A | 1/1997 | Tindell et al. |
| 5,602,992 | A | 2/1997 | Danneels |
| 5,623,483 | A | 4/1997 | Agrawal et al. |
| 5,625,350 | A | 4/1997 | Fukatsu et al. |
| 5,633,871 | A | 5/1997 | Bloks |
| D379,816 | S | 6/1997 | Laituri et al. |
| 5,636,345 | A | 6/1997 | Valdevit |
| 5,640,388 | A | 6/1997 | Woodhead et al. |
| D380,752 | S | 7/1997 | Hanson |
| 5,652,749 | A | 7/1997 | Davenport et al. |
| D382,271 | S | 8/1997 | Akwivu |
| 5,661,665 | A | 8/1997 | Glass et al. |
| 5,661,728 | A | 8/1997 | Finotello et al. |
| 5,668,884 | A | 9/1997 | Clair, Jr. et al. |
| 5,673,323 | A | 9/1997 | Schotz et al. |
| D384,940 | S | 10/1997 | Kono et al. |
| D387,352 | S | 12/1997 | Kaneko et al. |
| 5,696,896 | A | 12/1997 | Badovinatz et al. |
| D388,792 | S | 1/1998 | Nykerk |
| D389,143 | S | 1/1998 | Wicks |
| D392,641 | S | 3/1998 | Fenner |
| 5,726,989 | A | 3/1998 | Dokic |
| 5,732,059 | A | 3/1998 | Katsuyama et al. |
| D393,628 | S | 4/1998 | Ledbetter et al. |
| 5,740,235 | A | 4/1998 | Lester et al. |
| 5,742,623 | A | 4/1998 | Nuber et al. |
| D394,659 | S | 5/1998 | Biasotti et al. |
| 5,751,819 | A | 5/1998 | Dorough |
| 5,761,320 | A | 6/1998 | Farinelli et al. |
| 5,774,016 | A | 6/1998 | Ketterer |
| D395,889 | S | 7/1998 | Gerba et al. |
| 5,787,249 | A | 7/1998 | Badovinatz et al. |
| 5,790,543 | A | 8/1998 | Cloutier |
| D397,996 | S | 9/1998 | Smith |
| 5,808,662 | A | 9/1998 | Kinney et al. |
| 5,812,201 | A | 9/1998 | Yoo |
| 5,815,689 | A | 9/1998 | Shaw et al. |
| 5,818,948 | A | 10/1998 | Gulick |
| D401,587 | S | 11/1998 | Rudolph |

US 10,387,102 B2

Page 3

(56)

References Cited

U.S. PATENT DOCUMENTS

5,832,024 A 11/1998 Schotz et al.
5,838,909 A 11/1998 Roy et al.
5,848,152 A 12/1998 Slipy et al.
5,852,722 A 12/1998 Hamilton
D404,741 S 1/1999 Schumaker et al.
D405,071 S 2/1999 Gambaro
5,867,691 A 2/1999 Shiraishi
5,875,233 A 2/1999 Cox
5,875,354 A 2/1999 Charlton et al.
D406,847 S 3/1999 Gerba et al.
D407,071 S 3/1999 Keating
5,887,143 A 3/1999 Saito et al.
5,905,768 A 5/1999 Maturi et al.
D410,927 S 6/1999 Yamagishi
5,917,830 A 6/1999 Chen et al.
D412,337 S 7/1999 Hamano
5,923,869 A 7/1999 Kashiwagi et al.
5,923,902 A 7/1999 Inagaki
5,946,343 A 8/1999 Schotz et al.
5,956,025 A 9/1999 Goulden et al.
5,956,088 A 9/1999 Shen et al.
5,960,006 A 9/1999 Maturi et al.
D415,496 S 10/1999 Gerba et al.
D416,021 S 11/1999 Godette et al.
5,984,512 A 11/1999 Jones et al.
5,987,525 A 11/1999 Roberts et al.
5,987,611 A 11/1999 Freund
5,990,884 A 11/1999 Douma et al.
5,991,307 A 11/1999 Komuro et al.
5,999,906 A 12/1999 Mercs et al.
6,009,457 A 12/1999 Moller
6,018,376 A 1/2000 Nakatani
D420,006 S 2/2000 Tonino
6,026,150 A 2/2000 Frank et al.
6,029,196 A 2/2000 Lenz
6,031,818 A 2/2000 Lo et al.
6,032,202 A 2/2000 Lea et al.
6,038,614 A 3/2000 Chan et al.
6,046,550 A 4/2000 FERENCE et al.
6,061,457 A 5/2000 Stockhamer
6,078,725 A 6/2000 Tanaka
6,081,266 A 6/2000 Sciammarella
6,088,063 A 7/2000 Shiba
D429,246 S 8/2000 Holma
D430,143 S 8/2000 Renk
6,101,195 A 8/2000 Lyons et al.
6,108,485 A 8/2000 Kim
6,108,686 A 8/2000 Williams, Jr.
6,122,668 A 9/2000 Teng et al.
D431,552 S 10/2000 Backs et al.
D432,525 S 10/2000 Beecroft
6,127,941 A 10/2000 Van Ryzin
6,128,318 A 10/2000 Sato
6,148,205 A 11/2000 Cotton
6,154,772 A 11/2000 Dunn et al.
6,157,957 A 12/2000 Berthaud
6,163,647 A 12/2000 Terashima et al.
6,169,725 B1 1/2001 Gibbs et al.
6,175,872 B1 1/2001 Neumann et al.
6,181,383 B1 1/2001 Fox et al.
6,185,737 B1 2/2001 Northcutt et al.
6,195,435 B1 2/2001 Kitamura
6,195,436 B1 2/2001 Scibora et al.
6,199,169 B1 3/2001 Voth
6,212,282 B1 4/2001 Mershon
6,246,701 B1 6/2001 Slattery
6,253,293 B1 6/2001 Rao et al.
D444,475 S 7/2001 Levey et al.
6,255,961 B1 7/2001 Van Ryzin et al.
6,256,554 B1 7/2001 Dilorenzo
6,269,406 B1 7/2001 Dutcher et al.
6,301,012 B1 10/2001 White et al.
6,308,207 B1 10/2001 Tseng et al.
6,310,652 B1 10/2001 Li et al.
6,313,879 B1 11/2001 Kubo et al.

6,321,252 B1 11/2001 Bhola et al.
6,324,586 B1 11/2001 Johnson
D452,520 S 12/2001 Gotham et al.
6,332,147 B1 12/2001 Moran et al.
6,343,028 B1 1/2002 Kuwaoka
6,349,285 B1 2/2002 Liu et al.
6,349,339 B1 2/2002 Williams
6,349,352 B1 2/2002 Lea
6,351,821 B1 2/2002 Voth
6,353,172 B1 3/2002 Fay et al.
6,356,871 B1 3/2002 Hemkumar et al.
6,404,811 B1 6/2002 Cvetko et al.
6,418,150 B1 7/2002 Staats
6,430,353 B1 8/2002 Honda et al.
6,442,443 B1 8/2002 Fujii et al.
D462,339 S 9/2002 Allen et al.
D462,340 S 9/2002 Allen et al.
D462,945 S 9/2002 Skulley
6,446,080 B1 9/2002 Van Ryzin et al.
6,449,642 B2 9/2002 Bourke-Dunphy et al.
6,449,653 B2 9/2002 Klemets et al.
6,456,783 B1 9/2002 Ando et al.
6,463,474 B1 10/2002 Fuh et al.
6,466,832 B1 10/2002 Zuqert et al.
6,469,633 B1 10/2002 Wachter
D466,108 S 11/2002 Glodava et al.
6,487,296 B1 11/2002 Allen et al.
6,493,832 B1 12/2002 Itakura et al.
D468,297 S 1/2003 Ikeda
6,522,886 B1 2/2003 Youngs et al.
6,526,325 B1 2/2003 Sussman et al.
6,526,411 B1 2/2003 Ward
6,535,121 B2 3/2003 Mathney et al.
D474,763 S 5/2003 Tozaki et al.
D475,993 S 6/2003 Meyer
D476,643 S 7/2003 Yamagishi
D477,310 S 7/2003 Moransais
6,587,127 B1 7/2003 Leeke et al.
6,598,172 B1 7/2003 Vandeusen et al.
D478,051 S 8/2003 Sagawa
D478,069 S 8/2003 Beck et al.
D478,896 S 8/2003 Summers
6,611,537 B1 8/2003 Edens et al.
6,611,813 B1 8/2003 Bratton
D479,520 S 9/2003 De Saulles
D481,056 S 10/2003 Kawasaki et al.
6,631,410 B1 10/2003 Kowalski et al.
6,636,269 B1 10/2003 Baldwin
6,639,584 B1 10/2003 Li
6,653,899 B2 11/2003 Organvidez et al.
6,654,720 B1 11/2003 Graham et al.
6,654,956 B1 11/2003 Trinh et al.
6,658,091 B1 12/2003 Naidoo et al.
6,674,803 B1 1/2004 Kesselring
6,684,060 B1 1/2004 Curtin
D486,145 S 2/2004 Kaminski et al.
6,687,664 B1 2/2004 Sussman et al.
6,704,421 B1 3/2004 Kitamura
6,741,961 B2 5/2004 Lim
D491,925 S 6/2004 Griesau et al.
6,757,517 B2 6/2004 Chang
D493,148 S 7/2004 Shibata et al.
6,763,274 B1 7/2004 Gilbert
D495,333 S 8/2004 Borsboom
6,778,073 B2 8/2004 Lutter et al.
6,778,493 B1 8/2004 Ishii
6,778,869 B2 8/2004 Champion
D496,003 S 9/2004 Spira
D496,005 S 9/2004 Wang
D496,335 S 9/2004 Spira
6,795,852 B1 9/2004 Kleinrock et al.
D497,363 S 10/2004 Olson et al.
6,803,964 B1 10/2004 Post et al.
6,809,635 B1 10/2004 Kaaresoja
D499,086 S 11/2004 Polito
6,816,104 B1 11/2004 Lin
6,816,510 B1 11/2004 Banerjee
6,816,818 B2 11/2004 Wolf et al.
6,823,225 B1 11/2004 Sass

(56)

References Cited

U.S. PATENT DOCUMENTS

6,826,283	B1	11/2004	Wheeler et al.	7,218,930	B2	5/2007	Ko et al.
D499,395	S	12/2004	Hsu	7,236,739	B2	6/2007	Chang
D499,718	S	12/2004	Chen	7,236,773	B2	6/2007	Thomas
D500,015	S	12/2004	Gubbe	7,251,533	B2	7/2007	Yoon et al.
6,836,788	B2	12/2004	Kim et al.	7,257,398	B1	8/2007	Ukita et al.
6,839,752	B1	1/2005	Miller et al.	7,260,616	B1	8/2007	Cook
D501,477	S	2/2005	Hall	7,263,070	B1	8/2007	Delker et al.
6,859,460	B1	2/2005	Chen	7,263,110	B2	8/2007	Fujishiro
6,859,538	B1	2/2005	Voltz	7,277,547	B1	10/2007	Delker et al.
6,873,862	B2	3/2005	Reshefsky	7,286,652	B1	10/2007	Azriel et al.
6,882,335	B2	4/2005	Saarinén	7,289,631	B2	10/2007	Ishidoshiro
D504,872	S	5/2005	Uehara et al.	7,293,060	B2	11/2007	Komsi
D504,885	S	5/2005	Zhang et al.	7,295,548	B2	11/2007	Blank et al.
6,898,642	B2	5/2005	Chaffle et al.	7,305,694	B2	12/2007	Commons et al.
6,901,439	B1	5/2005	Bonasia et al.	7,308,188	B2	12/2007	Namatame
D506,463	S	6/2005	Daniels	7,310,334	B1	12/2007	Fitzgerald et al.
6,907,458	B2	6/2005	Tomassetti et al.	7,312,785	B2	12/2007	Tsuk et al.
6,910,078	B1	6/2005	Raman et al.	7,313,593	B1	12/2007	Pulito et al.
6,912,610	B2	6/2005	Spencer	7,319,764	B1	1/2008	Reid et al.
6,915,347	B2	7/2005	Hanko et al.	7,324,857	B2	1/2008	Goddard
6,917,592	B1	7/2005	Ramankutty et al.	7,330,875	B1	2/2008	Parasnis et al.
6,919,771	B2	7/2005	Nakajima	7,333,519	B2	2/2008	Sullivan et al.
6,920,373	B2	7/2005	Xi et al.	7,356,011	B1	4/2008	Waters et al.
6,931,557	B2	8/2005	Togawa	7,359,006	B1	4/2008	Xiang et al.
6,934,766	B1	8/2005	Russell	7,366,206	B2	4/2008	Lockridge et al.
6,937,988	B1	8/2005	Hemkumar et al.	7,372,846	B2	5/2008	Zwack
6,970,482	B2	11/2005	Kim	7,383,036	B2	6/2008	Kang et al.
6,985,694	B1	1/2006	De Bonet et al.	7,391,791	B2	6/2008	Balassanian et al.
6,987,767	B2	1/2006	Saito	7,392,102	B2	6/2008	Sullivan et al.
D515,072	S	2/2006	Lee	7,392,481	B2	6/2008	Gewickey et al.
D515,557	S	2/2006	Okuley	7,394,480	B2	7/2008	Song
7,006,758	B1	2/2006	Yamamoto et al.	7,400,644	B2	7/2008	Sakamoto et al.
7,007,106	B1	2/2006	Flood et al.	7,412,499	B2	8/2008	Chang et al.
7,020,791	B1	3/2006	Aweya et al.	7,428,310	B2	9/2008	Park
D518,475	S	4/2006	Yang et al.	7,430,181	B1	9/2008	Hong
7,043,477	B2	5/2006	Mercer et al.	7,433,324	B2	10/2008	Switzer et al.
7,043,651	B2	5/2006	Aweya et al.	7,434,166	B2	10/2008	Acharya et al.
7,046,677	B2	5/2006	Monta et al.	7,457,948	B1	11/2008	Bilicksa et al.
7,047,308	B2	5/2006	Deshpande	7,469,139	B2	12/2008	Van De Groenendaal
7,054,888	B2	5/2006	Lachapelle et al.	7,472,058	B2	12/2008	Tseng et al.
7,058,889	B2	6/2006	Trovato et al.	7,474,677	B2	1/2009	Trott
7,068,596	B1	6/2006	Mou	7,483,538	B2	1/2009	McCarty et al.
D524,296	S	7/2006	Kita	7,483,540	B2	1/2009	Rabinowitz et al.
D527,375	S	8/2006	Flora et al.	7,483,958	B1	1/2009	Elabbady et al.
7,092,528	B2	8/2006	Patrick et al.	7,492,912	B2	2/2009	Chung et al.
7,092,694	B2	8/2006	Griep et al.	7,505,889	B2	3/2009	Salmonsén et al.
7,096,169	B2	8/2006	Crutchfield et al.	7,509,181	B2	3/2009	Champion
7,102,513	B1	9/2006	Taskin et al.	7,519,667	B1	4/2009	Capps
7,106,224	B2	9/2006	Knapp et al.	7,548,744	B2	6/2009	Oesterling et al.
7,113,999	B2	9/2006	Pestoni et al.	7,548,851	B1	6/2009	Lau et al.
7,115,017	B1	10/2006	Laursen et al.	7,558,224	B1	7/2009	Surazski et al.
7,120,168	B2	10/2006	Zimmermann	7,558,635	B1	7/2009	Thiel et al.
7,130,316	B2	10/2006	Kovacevic	7,571,014	B1	8/2009	Lambourne et al.
7,130,368	B1	10/2006	Aweya et al.	7,574,274	B2	8/2009	Holmes
7,130,608	B2	10/2006	Hollstrom et al.	7,599,685	B2	10/2009	Goldberg et al.
7,130,616	B2	10/2006	Janik	7,606,174	B2	10/2009	Ochi et al.
7,136,934	B2	11/2006	Carter et al.	7,607,091	B2	10/2009	Song et al.
7,139,981	B2	11/2006	Mayer et al.	7,627,825	B2	12/2009	Kakuda
7,143,141	B1	11/2006	Morgan et al.	7,630,501	B2	12/2009	Blank et al.
7,143,939	B2	12/2006	Henzerling	7,631,119	B2	12/2009	Moore et al.
7,146,260	B2	12/2006	Preston et al.	7,643,894	B2	1/2010	Braithwaite et al.
7,158,488	B2	1/2007	Fujimori	7,653,344	B1	1/2010	Feldman et al.
7,161,939	B2	1/2007	Israel et al.	7,657,224	B2	2/2010	Goldberg et al.
7,162,315	B2	1/2007	Gilbert	7,657,644	B1	2/2010	Zheng
7,164,694	B1	1/2007	Nodoushani et al.	7,657,910	B1	2/2010	McAulay et al.
7,167,765	B2	1/2007	Janik	7,665,115	B2	2/2010	Gallo et al.
7,185,090	B2	2/2007	Kowalski et al.	7,668,990	B2	2/2010	Krzyzanowski et al.
7,187,947	B1	3/2007	White et al.	7,669,113	B1	2/2010	Moore et al.
7,188,353	B1	3/2007	Crinon	7,669,219	B2	2/2010	Scott, III
7,197,148	B2	3/2007	Nourse et al.	7,672,470	B2	3/2010	Lee
7,206,367	B1	4/2007	Moore	7,675,943	B2	3/2010	Mosig et al.
7,206,618	B2	4/2007	Latto et al.	7,676,044	B2	3/2010	Sasaki et al.
7,206,967	B1	4/2007	Marti et al.	7,676,142	B1	3/2010	Hung
7,209,795	B2	4/2007	Sullivan et al.	7,688,306	B2	3/2010	Wehrenberg et al.
7,218,708	B2	5/2007	Berezowski et al.	7,689,304	B2	3/2010	Sasaki
				7,689,305	B2	3/2010	Kreifeldt et al.
				7,702,279	B2	4/2010	Ko et al.
				7,702,403	B1	4/2010	Gladwin et al.
				7,710,941	B2	5/2010	Rietschel et al.

(56)

References Cited

U.S. PATENT DOCUMENTS

7,711,774 B1	5/2010	Rothschild	8,275,910 B1	9/2012	Hauck
7,720,096 B2	5/2010	Klemets	8,279,709 B2	10/2012	Choisel et al.
7,721,032 B2	5/2010	Bushell et al.	8,281,001 B2	10/2012	Busam et al.
7,742,740 B2	6/2010	Goldberg et al.	8,285,404 B1	10/2012	Kekki
7,743,009 B2	6/2010	Hangartner et al.	8,290,603 B1	10/2012	Lambourne
7,746,906 B2	6/2010	Jinzaki et al.	8,300,845 B2	10/2012	Zurek et al.
7,756,743 B1	7/2010	Lapcevic	8,311,226 B2	11/2012	Lorgeoux et al.
7,761,176 B2	7/2010	Ben-Yaacov et al.	8,315,555 B2	11/2012	Ko et al.
7,765,315 B2	7/2010	Batson et al.	8,316,147 B2	11/2012	Batson et al.
RE41,608 E	8/2010	Blair et al.	8,325,931 B2	12/2012	Howard et al.
7,793,206 B2	9/2010	Lim et al.	8,326,951 B1	12/2012	Millington et al.
7,827,259 B2	11/2010	Heller et al.	8,340,330 B2	12/2012	Yoon et al.
7,831,054 B2	11/2010	Ball et al.	8,345,709 B2	1/2013	Nitzpon et al.
7,835,689 B2	11/2010	Goldberg et al.	8,364,295 B2	1/2013	Beckmann et al.
7,853,341 B2	12/2010	McCarty et al.	8,370,678 B2	2/2013	Millington et al.
7,865,137 B2	1/2011	Goldberg et al.	8,374,595 B2	2/2013	Chien et al.
7,882,234 B2	2/2011	Watanabe et al.	8,407,623 B2	3/2013	Kerr et al.
7,885,622 B2	2/2011	Krampf et al.	8,411,883 B2	4/2013	Matsumoto
7,907,819 B2	3/2011	Ando et al.	8,423,659 B2	4/2013	Millington
7,916,877 B2	3/2011	Goldberg et al.	8,423,893 B2	4/2013	Ramsay et al.
7,917,082 B2	3/2011	Goldberg et al.	8,432,851 B2	4/2013	Xu et al.
7,933,418 B2	4/2011	Morishima	8,433,076 B2	4/2013	Zurek et al.
7,934,239 B1	4/2011	Dagman	8,442,239 B2	5/2013	Bruelle-Drews et al.
7,945,143 B2	5/2011	Yahata et al.	8,457,334 B2	6/2013	Yoon et al.
7,945,636 B2	5/2011	Nelson et al.	8,463,184 B2	6/2013	Dua
7,945,708 B2	5/2011	Ohkita	8,463,875 B2	6/2013	Katz et al.
7,958,441 B2	6/2011	Heller et al.	8,473,844 B2	6/2013	Kreifeldt et al.
7,966,388 B1	6/2011	Pugaczewski et al.	8,477,958 B2	7/2013	Moeller et al.
7,987,294 B2	7/2011	Bryce et al.	8,483,853 B1	7/2013	Lambourne
7,995,732 B2	8/2011	Koch et al.	8,509,211 B2	8/2013	Trotter et al.
7,996,566 B1	8/2011	Sylvain et al.	8,520,870 B2	8/2013	Sato et al.
7,996,588 B2	8/2011	Subbiah et al.	8,565,455 B2	10/2013	Worrell et al.
8,014,423 B2	9/2011	Thaler et al.	8,577,048 B2	11/2013	Chaikin et al.
8,015,306 B2	9/2011	Bowman	8,588,949 B2	11/2013	Lambourne et al.
8,020,023 B2	9/2011	Millington et al.	8,600,084 B1	12/2013	Garrett
8,023,663 B2	9/2011	Goldberg	8,611,559 B2	12/2013	Sanders
8,028,038 B2	9/2011	Weel	8,615,091 B2	12/2013	Terwal
8,028,323 B2	9/2011	Weel	8,639,830 B2	1/2014	Bowman
8,041,062 B2	10/2011	Cohen et al.	8,654,995 B2	2/2014	Silber et al.
8,045,721 B2	10/2011	Burgan et al.	8,672,744 B1	3/2014	Gronkowski et al.
8,045,952 B2	10/2011	Qureshey et al.	8,683,009 B2	3/2014	Ng et al.
8,050,203 B2	11/2011	Jacobsen et al.	8,689,036 B2	4/2014	Millington et al.
8,050,652 B2	11/2011	Qureshey et al.	8,731,206 B1	5/2014	Park
8,055,364 B2	11/2011	Champion	8,750,282 B2	6/2014	Gelter et al.
8,074,253 B1	12/2011	Nathan	8,751,026 B2	6/2014	Sato et al.
8,086,752 B2	12/2011	Millington et al.	8,762,565 B2	6/2014	Togashi et al.
8,090,317 B2	1/2012	Burge et al.	8,775,546 B2	7/2014	Millington
8,103,009 B2	1/2012	McCarty et al.	8,818,538 B2	8/2014	Sakata
8,111,132 B2	2/2012	Allen et al.	8,819,554 B2	8/2014	Basso et al.
8,112,032 B2	2/2012	Ko et al.	8,831,761 B2	9/2014	Kemp et al.
8,116,476 B2	2/2012	Inohara	8,843,586 B2	9/2014	Pantos et al.
8,126,172 B2	2/2012	Horbach et al.	8,861,739 B2	10/2014	Ojanpera
8,131,389 B1	3/2012	Hardwick et al.	8,868,698 B2	10/2014	Millington et al.
8,131,390 B2	3/2012	Braithwaite et al.	8,885,851 B2	11/2014	Westenbroek
8,144,883 B2	3/2012	Pdersen et al.	8,904,066 B2	12/2014	Moore et al.
8,148,622 B2	4/2012	Rothkopf et al.	8,917,877 B2	12/2014	Haaff et al.
8,150,079 B2	4/2012	Maeda et al.	8,930,006 B2	1/2015	Haatainen
8,169,938 B2	5/2012	Duchscher et al.	8,934,647 B2	1/2015	Joyce et al.
8,170,222 B2	5/2012	Dunko	8,934,655 B2	1/2015	Breen et al.
8,170,260 B2	5/2012	Reining et al.	8,938,637 B2	1/2015	Millington et al.
8,175,297 B1	5/2012	Ho et al.	8,942,252 B2	1/2015	Balassanian et al.
8,185,674 B2	5/2012	Moore et al.	8,942,395 B2	1/2015	Lissaman et al.
8,194,874 B2	6/2012	Starobin et al.	8,954,177 B2	2/2015	Sanders
8,204,890 B1	6/2012	Gogan	8,965,544 B2	2/2015	Ramsay
8,208,653 B2	6/2012	Eo et al.	8,966,394 B2	2/2015	Gates et al.
8,214,447 B2	7/2012	Deslippe et al.	9,042,556 B2	5/2015	Kallai et al.
8,214,740 B2	7/2012	Johnson	9,130,770 B2	9/2015	Millington et al.
8,214,873 B2	7/2012	Weel	9,137,602 B2	9/2015	Mayman et al.
8,218,790 B2	7/2012	Bull et al.	9,160,965 B2	10/2015	Redmann et al.
8,230,099 B2	7/2012	Weel	9,195,258 B2	11/2015	Millington
8,233,029 B2	7/2012	Yoshida et al.	9,456,243 B1	9/2016	Hughes et al.
8,233,648 B2	7/2012	Sorek et al.	9,507,780 B2	11/2016	Rothkopf et al.
8,234,305 B2	7/2012	Seligmann et al.	2001/0001160 A1	5/2001	Shoff et al.
8,234,395 B2	7/2012	Millington et al.	2001/0009604 A1	7/2001	Ando et al.
8,239,748 B1	8/2012	Moore et al.	2001/0022823 A1	9/2001	Renaud
			2001/0027498 A1	10/2001	Van De Meulenhof et al.
			2001/0032188 A1	10/2001	Miyabe et al.
			2001/0042107 A1	11/2001	Palm
			2001/0043456 A1	11/2001	Atkinson

(56)

References Cited

U.S. PATENT DOCUMENTS

2001/0046235	A1	11/2001	Trevitt et al.	2003/0099221	A1	5/2003	Rhee
2001/0047377	A1	11/2001	Sincaglia et al.	2003/0101253	A1	5/2003	Saito et al.
2001/0050991	A1	12/2001	Eves	2003/0103088	A1	6/2003	Dresti et al.
2002/0002039	A1	1/2002	Qureshey et al.	2003/0109270	A1	6/2003	Shorty
2002/0002562	A1	1/2002	Moran et al.	2003/0110329	A1	6/2003	Higaki et al.
2002/0002565	A1	1/2002	Ohyama	2003/0118158	A1	6/2003	Hattori
2002/0003548	A1	1/2002	Krusche et al.	2003/0123853	A1	7/2003	Iwahara et al.
2002/0015003	A1	2/2002	Kato et al.	2003/0126211	A1	7/2003	Anttila et al.
2002/0022453	A1	2/2002	Balog et al.	2003/0135822	A1	7/2003	Evans
2002/0026442	A1	2/2002	Lipscomb et al.	2003/0157951	A1	8/2003	Hasty
2002/0034374	A1	3/2002	Barton	2003/0167335	A1	9/2003	Alexander
2002/0035621	A1	3/2002	Zintel et al.	2003/0172123	A1	9/2003	Polan et al.
2002/0042844	A1	4/2002	Chiazzeze	2003/0179780	A1	9/2003	Walker et al.
2002/0049843	A1	4/2002	Barone et al.	2003/0182254	A1	9/2003	Plastina et al.
2002/0062406	A1	5/2002	Chang et al.	2003/0185400	A1	10/2003	Yoshizawa et al.
2002/0065926	A1	5/2002	Hackney et al.	2003/0187657	A1	10/2003	Erhart et al.
2002/0067909	A1	6/2002	Iivonen	2003/0195964	A1	10/2003	Mane
2002/0072816	A1	6/2002	Shdema et al.	2003/0198254	A1	10/2003	Sullivan et al.
2002/0072817	A1	6/2002	Champion	2003/0198255	A1	10/2003	Sullivan et al.
2002/0073228	A1	6/2002	Cognet et al.	2003/0198257	A1	10/2003	Sullivan et al.
2002/0078293	A1	6/2002	Kou et al.	2003/0200001	A1	10/2003	Goddard
2002/0080783	A1	6/2002	Fujimori	2003/0204273	A1	10/2003	Dinker et al.
2002/0090914	A1	7/2002	Kang et al.	2003/0204509	A1	10/2003	Dinker et al.
2002/0093478	A1	7/2002	Yeh	2003/0210347	A1	11/2003	Kondo
2002/0095460	A1	7/2002	Benson	2003/0210796	A1	11/2003	McCarty et al.
2002/0098878	A1	7/2002	Mooney et al.	2003/0212802	A1	11/2003	Rector et al.
2002/0101357	A1	8/2002	Gharapetian	2003/0219007	A1	11/2003	Barrack et al.
2002/0103635	A1	8/2002	Mesarovic et al.	2003/0227478	A1	12/2003	Chatfield
2002/0109710	A1	8/2002	Holtz et al.	2003/0229900	A1	12/2003	Reisman
2002/0112244	A1	8/2002	Liou et al.	2003/0231208	A1	12/2003	Hanon et al.
2002/0114354	A1	8/2002	Sinha et al.	2003/0231871	A1	12/2003	Ushimaru
2002/0114359	A1	8/2002	Ibaraki et al.	2003/0235304	A1	12/2003	Evans et al.
2002/0124097	A1	9/2002	Isely et al.	2004/0001106	A1	1/2004	Deutscher et al.
2002/0124182	A1	9/2002	Bacso et al.	2004/0001484	A1	1/2004	Ozguner
2002/0129156	A1	9/2002	Yoshikawa	2004/0001591	A1	1/2004	Mani et al.
2002/0131398	A1	9/2002	Taylor	2004/0002938	A1	1/2004	Deguchi
2002/0131761	A1	9/2002	Kawasaki et al.	2004/0008852	A1	1/2004	Also et al.
2002/0136335	A1	9/2002	Liou et al.	2004/0010727	A1	1/2004	Fujinami
2002/0137505	A1	9/2002	Eiche et al.	2004/0012620	A1	1/2004	Buhler et al.
2002/0143998	A1	10/2002	Rajagopal et al.	2004/0014426	A1	1/2004	Moore
2002/0150053	A1	10/2002	Gray et al.	2004/0015252	A1	1/2004	Aiso et al.
2002/0159596	A1	10/2002	Durand et al.	2004/0019497	A1	1/2004	Volk et al.
2002/0163361	A1	11/2002	Parkin	2004/0019807	A1	1/2004	Freund et al.
2002/0165721	A1	11/2002	Chang et al.	2004/0019911	A1	1/2004	Gates et al.
2002/0165921	A1	11/2002	Sapieyevski	2004/0023697	A1	2/2004	Komura
2002/0168938	A1	11/2002	Chang	2004/0024478	A1	2/2004	Hans et al.
2002/0173273	A1	11/2002	Spurgat et al.	2004/0024925	A1	2/2004	Cypher et al.
2002/0177411	A1	11/2002	Yajima et al.	2004/0027166	A1	2/2004	Mangum et al.
2002/0181355	A1	12/2002	Shikunami et al.	2004/0032348	A1	2/2004	Lai et al.
2002/0184310	A1	12/2002	Traversat et al.	2004/0032421	A1	2/2004	Williamson et al.
2002/0188762	A1	12/2002	Tomassetti et al.	2004/0032922	A1	2/2004	Knapp et al.
2002/0194260	A1	12/2002	Headley et al.	2004/0037433	A1	2/2004	Chen
2002/0194309	A1	12/2002	Carter et al.	2004/0041836	A1	3/2004	Zaner et al.
2003/0002609	A1	1/2003	Faller et al.	2004/0042629	A1	3/2004	Mellone et al.
2003/0008616	A1	1/2003	Anderson	2004/0044742	A1	3/2004	Evron et al.
2003/0014486	A1	1/2003	May	2004/0048569	A1	3/2004	Kawamura
2003/0018797	A1	1/2003	Dunning et al.	2004/0059842	A1	3/2004	Hanson et al.
2003/0020763	A1	1/2003	Mayer et al.	2004/0059965	A1	3/2004	Marshall et al.
2003/0023741	A1	1/2003	Tomassetti et al.	2004/0066736	A1	4/2004	Kroeger
2003/0035072	A1	2/2003	Hagg	2004/0075767	A1	4/2004	Neuman et al.
2003/0035444	A1	2/2003	Zwack	2004/0078383	A1	4/2004	Mercer et al.
2003/0041173	A1	2/2003	Hoyle	2004/0080671	A1	4/2004	Siemens et al.
2003/0041174	A1	2/2003	Wen et al.	2004/0093096	A1	5/2004	Huang et al.
2003/0043856	A1	3/2003	Lakaniemi et al.	2004/0098754	A1	5/2004	Vella et al.
2003/0043924	A1	3/2003	Haddad et al.	2004/0111473	A1	6/2004	Lysenko et al.
2003/0050058	A1	3/2003	Walsh et al.	2004/0117462	A1	6/2004	Bodin et al.
2003/0055892	A1	3/2003	Huitema et al.	2004/0117491	A1	6/2004	Karaoguz et al.
2003/0061428	A1	3/2003	Garney et al.	2004/0117840	A1	6/2004	Boudreau et al.
2003/0063528	A1	4/2003	Ogikubo	2004/0117858	A1	6/2004	Boudreau et al.
2003/0063755	A1	4/2003	Nourse et al.	2004/0128701	A1	7/2004	Kaneko et al.
2003/0066094	A1	4/2003	Van Der Schaar et al.	2004/0131192	A1	7/2004	Metcalfe
2003/0067437	A1	4/2003	McClintock et al.	2004/0133689	A1	7/2004	Vasishth
2003/0073432	A1	4/2003	Meade	2004/0143368	A1	7/2004	May et al.
2003/0097478	A1	5/2003	King	2004/0143675	A1	7/2004	Aust
2003/0099212	A1	5/2003	Anjum et al.	2004/0143852	A1	7/2004	Meyers
				2004/0148237	A1	7/2004	Bittmann et al.
				2004/0168081	A1	8/2004	Ladas et al.
				2004/0170383	A1	9/2004	Mazur
				2004/0171346	A1	9/2004	Lin

(56)

References Cited

U.S. PATENT DOCUMENTS

2004/0177167	A1	9/2004	Iwamura et al.	2007/0003067	A1	1/2007	Gierl et al.
2004/0179554	A1	9/2004	Tsao	2007/0022207	A1	1/2007	Millington et al.
2004/0183827	A1	9/2004	Putterman et al.	2007/0038999	A1	2/2007	Millington et al.
2004/0185773	A1	9/2004	Gerber et al.	2007/0043847	A1	2/2007	Carter et al.
2004/0189363	A1	9/2004	Takano	2007/0047712	A1	3/2007	Gross et al.
2004/0203378	A1	10/2004	Powers	2007/0048713	A1	3/2007	Plastina et al.
2004/0203590	A1	10/2004	Shteyn	2007/0054680	A1	3/2007	Mo et al.
2004/0208158	A1	10/2004	Fellman et al.	2007/0087686	A1	4/2007	Holm et al.
2004/0213230	A1	10/2004	Douskalis et al.	2007/0142022	A1	6/2007	Madonna et al.
2004/0223622	A1	11/2004	Lindemann et al.	2007/0142944	A1	6/2007	Goldberg et al.
2004/0224638	A1	11/2004	Fadell et al.	2007/0143493	A1	6/2007	Mullig et al.
2004/0228367	A1	11/2004	Mosig et al.	2007/0169115	A1	7/2007	Ko et al.
2004/0248601	A1	12/2004	Chang	2007/0180137	A1	8/2007	Rajapakse
2004/0249490	A1	12/2004	Sakai	2007/0192156	A1	8/2007	Gauger
2004/0249965	A1	12/2004	Huggins et al.	2007/0249295	A1	10/2007	Ukita et al.
2004/0249982	A1	12/2004	Arnold et al.	2007/0265031	A1	11/2007	Koizumi et al.
2004/0252400	A1	12/2004	Blank et al.	2007/0271388	A1	11/2007	Bowra et al.
2004/0253969	A1	12/2004	Nguyen et al.	2007/0299778	A1	12/2007	Haveson et al.
2005/0010691	A1	1/2005	Oyadomari et al.	2008/0002836	A1	1/2008	Moeller et al.
2005/0011388	A1	1/2005	Kouznetsov	2008/0007649	A1	1/2008	Bennett
2005/0013394	A1	1/2005	Rausch et al.	2008/0007650	A1	1/2008	Bennett
2005/0015551	A1	1/2005	Eames et al.	2008/0007651	A1	1/2008	Bennett
2005/0021590	A1	1/2005	Debique et al.	2008/0018785	A1	1/2008	Bennett
2005/0027821	A1	2/2005	Alexander et al.	2008/0022320	A1	1/2008	Ver Steeg
2005/0047605	A1	3/2005	Lee et al.	2008/0025535	A1	1/2008	Rajapakse
2005/0058149	A1	3/2005	Howe	2008/0060084	A1	3/2008	Gappa et al.
2005/0060435	A1	3/2005	Xue et al.	2008/0072816	A1	3/2008	Riess et al.
2005/0062637	A1	3/2005	El Zabadani et al.	2008/0075295	A1	3/2008	Mayman et al.
2005/0081213	A1	4/2005	Suzuoki et al.	2008/0077619	A1	3/2008	Gilley et al.
2005/0102699	A1	5/2005	Kim et al.	2008/0077620	A1	3/2008	Gilley et al.
2005/0105052	A1	5/2005	McCormick et al.	2008/0086318	A1	4/2008	Gilley et al.
2005/0114538	A1	5/2005	Rose	2008/0091771	A1	4/2008	Allen et al.
2005/0120128	A1	6/2005	Willes et al.	2008/0120429	A1	5/2008	Millington et al.
2005/0125222	A1	6/2005	Brown et al.	2008/0126943	A1	5/2008	Parasnis et al.
2005/0125357	A1	6/2005	Saadat et al.	2008/0144861	A1	6/2008	Melanson et al.
2005/0131558	A1	6/2005	Braithwaite et al.	2008/0144864	A1	6/2008	Huon
2005/0154766	A1	7/2005	Huang et al.	2008/0146289	A1	6/2008	Korneluk et al.
2005/0159833	A1	7/2005	Giaimo et al.	2008/0189272	A1	8/2008	Powers et al.
2005/0160270	A1	7/2005	Goldberg et al.	2008/0205070	A1	8/2008	Osada
2005/0166135	A1	7/2005	Burke et al.	2008/0212786	A1	9/2008	Park
2005/0168630	A1	8/2005	Yamada et al.	2008/0215169	A1	9/2008	Debettencourt et al.
2005/0170781	A1	8/2005	Jacobsen et al.	2008/0263010	A1	10/2008	Roychoudhuri et al.
2005/0177643	A1	8/2005	Xu	2008/0303947	A1	12/2008	Ohnishi et al.
2005/0181348	A1	8/2005	Carey et al.	2009/0011798	A1	1/2009	Yamada
2005/0195205	A1	9/2005	Abrams	2009/0017868	A1	1/2009	Ueda et al.
2005/0195823	A1	9/2005	Chen et al.	2009/0031336	A1	1/2009	Chavez et al.
2005/0197725	A1	9/2005	Alexander et al.	2009/0062947	A1	3/2009	Lydon et al.
2005/0198574	A1	9/2005	Lamkin et al.	2009/0070434	A1	3/2009	Himmelstein
2005/0201549	A1	9/2005	Dedieu et al.	2009/0077610	A1	3/2009	White et al.
2005/0215265	A1	9/2005	Sharma	2009/0089327	A1	4/2009	Kalaboukis et al.
2005/0216556	A1	9/2005	Manion et al.	2009/0100189	A1	4/2009	Bahren et al.
2005/0239445	A1	10/2005	Karaoguz et al.	2009/0124289	A1	5/2009	Nishida
2005/0246421	A1	11/2005	Moore et al.	2009/0157905	A1	6/2009	Davis
2005/0262217	A1	11/2005	Nonaka et al.	2009/0164655	A1	6/2009	Pettersson et al.
2005/0281255	A1	12/2005	Davies et al.	2009/0193345	A1	7/2009	Wensley et al.
2005/0283820	A1	12/2005	Richards et al.	2009/0222115	A1	9/2009	Malcolm et al.
2005/0288805	A1	12/2005	Moore et al.	2009/0222392	A1	9/2009	Martin et al.
2005/0289224	A1	12/2005	Deslippe et al.	2009/0228919	A1	9/2009	Zott et al.
2006/0041639	A1	2/2006	Lamkin et al.	2009/0251604	A1	10/2009	Iyer
2006/0049966	A1	3/2006	Ozawa et al.	2010/0004983	A1	1/2010	Dickerson et al.
2006/0072489	A1	4/2006	Toyoshima	2010/0031366	A1	2/2010	Knight et al.
2006/0095516	A1	5/2006	Wijeratne	2010/0049835	A1	2/2010	Ko et al.
2006/0098936	A1	5/2006	Ikeda et al.	2010/0087089	A1	4/2010	Struthers et al.
2006/0119497	A1	6/2006	Miller et al.	2010/0228740	A1	9/2010	Cannistraro et al.
2006/0142034	A1	6/2006	Wentink et al.	2010/0284389	A1	11/2010	Ramsay et al.
2006/0143236	A1	6/2006	Wu	2010/0299639	A1	11/2010	Ramsay et al.
2006/0155721	A1	7/2006	Grunwald et al.	2011/0001632	A1	1/2011	Hohorst
2006/0161742	A1	7/2006	Sugimoto et al.	2011/0002487	A1	1/2011	Panther et al.
2006/0173844	A1	8/2006	Zhang et al.	2011/0066943	A1	3/2011	Brillon et al.
2006/0173976	A1	8/2006	Vincent et al.	2011/0228944	A1	9/2011	Croghan et al.
2006/0193454	A1	8/2006	Abou-Chakra et al.	2011/0316768	A1	12/2011	McRae
2006/0222186	A1	10/2006	Paige et al.	2012/0029671	A1	2/2012	Millington et al.
2006/0227985	A1	10/2006	Kawanami	2012/0030366	A1	2/2012	Collart et al.
2006/0259649	A1	11/2006	Hsieh et al.	2012/0051567	A1	3/2012	Castor-Perry
2006/0270395	A1	11/2006	Dhawan et al.	2012/0060046	A1	3/2012	Millington
				2012/0129446	A1	5/2012	Ko et al.
				2012/0148075	A1	6/2012	Goh et al.
				2012/0185771	A1	7/2012	Rothkopf et al.
				2012/0192071	A1	7/2012	Millington

(56)

References Cited

U.S. PATENT DOCUMENTS

2012/0207290 A1 8/2012 Moyers et al.
 2012/0237054 A1 9/2012 Eo et al.
 2012/0281058 A1 11/2012 Laney et al.
 2012/0290621 A1 11/2012 Heitz, III et al.
 2013/0013757 A1 1/2013 Millington et al.
 2013/0018960 A1 1/2013 Knysz et al.
 2013/0031475 A1 1/2013 Maor et al.
 2013/0038726 A1 2/2013 Kim
 2013/0041954 A1 2/2013 Kim et al.
 2013/0047084 A1 2/2013 Sanders et al.
 2013/0052940 A1 2/2013 Brillhart et al.
 2013/0070093 A1 3/2013 Rivera et al.
 2013/0080599 A1 3/2013 Ko et al.
 2013/0094670 A1 4/2013 Millington
 2013/0124664 A1 5/2013 Fonseca, Jr. et al.
 2013/0129122 A1 5/2013 Johnson et al.
 2013/0132837 A1 5/2013 Mead et al.
 2013/0159126 A1 6/2013 Elkady
 2013/0167029 A1 6/2013 Friesen et al.
 2013/0174100 A1 7/2013 Seymour et al.
 2013/0174223 A1 7/2013 Dykeman et al.
 2013/0179163 A1 7/2013 Herbig et al.
 2013/0191454 A1 7/2013 Oliver et al.
 2013/0197682 A1 8/2013 Millington
 2013/0208911 A1 8/2013 Millington
 2013/0208921 A1 8/2013 Millington
 2013/0226323 A1 8/2013 Millington
 2013/0230175 A1 9/2013 Bech et al.
 2013/0232416 A1 9/2013 Millington
 2013/0253934 A1 9/2013 Parekh et al.
 2013/0279706 A1 10/2013 Marti
 2013/0287186 A1 10/2013 Quady
 2013/0290504 A1 10/2013 Quady
 2014/0006483 A1 1/2014 Garmark et al.
 2014/0037097 A1 2/2014 Labosco
 2014/0064501 A1 3/2014 Olsen et al.
 2014/0075308 A1 3/2014 Sanders et al.
 2014/0075311 A1 3/2014 Boettcher et al.
 2014/0079242 A1 3/2014 Nguyen et al.
 2014/0108929 A1 4/2014 Garmark et al.
 2014/0123005 A1 5/2014 Forstall et al.
 2014/0140530 A1 5/2014 Gomes-Casseres et al.
 2014/0161265 A1 6/2014 Chaikin et al.
 2014/0181569 A1 6/2014 Millington et al.
 2014/0233755 A1 8/2014 Kim et al.
 2014/0242913 A1 8/2014 Pang
 2014/0256260 A1 9/2014 Ueda et al.
 2014/0267148 A1 9/2014 Luna et al.
 2014/0270202 A1 9/2014 Ivanov et al.
 2014/0273859 A1 9/2014 Luna et al.
 2014/0279889 A1 9/2014 Luna
 2014/0285313 A1 9/2014 Luna et al.
 2014/0286496 A1 9/2014 Luna et al.
 2014/0298174 A1 10/2014 Ikononov
 2014/0323036 A1 10/2014 Daley et al.
 2014/0344689 A1 11/2014 Scott et al.
 2014/0378056 A1 12/2014 Liu
 2015/0019670 A1 1/2015 Redmann
 2015/0026613 A1 1/2015 Kwon et al.
 2015/0032844 A1 1/2015 Tarr et al.
 2015/0043736 A1 2/2015 Olsen et al.
 2015/0049248 A1 2/2015 Wang et al.
 2015/0074527 A1 3/2015 Sevigny et al.
 2015/0074528 A1 3/2015 Sakalowsky et al.
 2015/0098576 A1 4/2015 Sundaresan et al.
 2015/0139210 A1 5/2015 Marin et al.
 2015/0256954 A1 9/2015 Carlsson et al.
 2015/0304288 A1 10/2015 Balasaygun et al.
 2015/0365987 A1 12/2015 Weel

FOREIGN PATENT DOCUMENTS

CN 101292500 A 10/2008
 EP 0251584 A2 1/1988
 EP 0672985 A1 9/1995

EP 0772374 A2 5/1997
 EP 1111527 A2 6/2001
 EP 1122931 A2 8/2001
 EP 1312188 A1 5/2003
 EP 1389853 A1 2/2004
 EP 2713281 4/2004
 EP 1517464 A2 3/2005
 EP 0895427 A3 1/2006
 EP 1416687 B1 8/2006
 EP 1410686 3/2008
 EP 2043381 A2 4/2009
 EP 2161950 A2 3/2010
 EP 0742674 B1 4/2014
 EP 2591617 B1 6/2014
 GB 2284327 A 5/1995
 GB 2338374 12/1999
 GB 2379533 A 3/2003
 GB 2486183 6/2012
 JP 63269633 11/1988
 JP 07-210129 8/1995
 JP 2000149391 A 5/2000
 JP 2001034951 2/2001
 JP 2002111817 4/2002
 JP 2002123267 A 4/2002
 JP 2002141915 A 5/2002
 JP 2002358241 A 12/2002
 JP 2003037585 2/2003
 JP 2003506765 A 2/2003
 JP 2003101958 4/2003
 JP 2003169089 A 6/2003
 JP 2005108427 4/2005
 JP 2005136457 5/2005
 JP 2007241652 A 9/2007
 JP 2009506603 A 2/2009
 JP 2009075540 A 4/2009
 JP 2009135750 6/2009
 JP 2009535708 10/2009
 JP 2009538006 A 10/2009
 JP 2011130496 6/2011
 TW 439027 6/2001
 WO 199525313 9/1995
 WO 1999023560 5/1999
 WO 199961985 12/1999
 WO 0019693 A1 4/2000
 WO 0110125 A1 2/2001
 WO 200153994 7/2001
 WO 02073851 9/2002
 WO 03093950 A2 11/2003
 WO 2003093950 A2 11/2003
 WO 2005013047 2/2005
 WO 2007023120 A1 3/2007
 WO 2007127485 11/2007
 WO 2007131555 11/2007
 WO 2007135581 A2 11/2007
 WO 2008082350 A1 7/2008
 WO 2008114389 A1 9/2008
 WO 2012050927 4/2012
 WO 2014004182 1/2014
 WO 2014149533 A2 9/2014

OTHER PUBLICATIONS

UPnP Design by Example, A Software Developers Guide to Universal Plug and Play Michael Jeronimo and JackWeast, Intel Press (D+M_0401307-818) (Apr. 2003) (511 pages).
 WANCommonInterfaceConfig:1 Service Template Version 1.01 for UPnP, Ver. 1.0 (Nov. 12, 2001) (D+M_0401820-43) (24 pages).
 WANIPConnection:1 Service Template Version 1.01 for UPnP Ver. 1.0 (Nov. 12, 2001) (D+M_0401844-917) (74 pages).
 WANPPConnection:1 Service Template Version 1.01 for UPnP, Version 1.0 (Nov. 12, 2001) (D+M_0401918-2006) (89 pages).
 Windows Media Connect Device Compatibility Specification (Apr. 12, 2004) (16 pages).
 "Symantec pcAnywhere User's Guide," v 10.5.1, 1995-2002, 154 pages.
 Rothermel et al., "Clock Hierarchies—An Abstraction for Grouping and Controlling Media Streams," University of Stuttgart Institute of

(56)

References Cited**OTHER PUBLICATIONS**

Parallel and Distributed High-Performance Systems, Jan. 1996, 23 pages.

Rothermel, Kurt, "State-of-the-Art and Future Research in Stream Synchronization," University of Stuttgart, 3 pages.

Simple Network Time Protocol (SNTP), RFC 1361 (Aug. 1992) (D+M_0397537-46) (10 pages).

Simple Network Time Protocol (SNTP), RFC 1769 (Mar. 1995) (D+M_0397663-76) (14 pages).

Simple Service Discovery Protocol/1.0 Operating without an Arbiter (Oct. 28, 1999) (24 pages).

Sonos, Inc. v. D&M Holdings, D&M Supp Opposition Brief including Exhibits, Mar. 17, 2017, 23 pages.

Sonos, Inc. v. D&M Holdings, Expert Report of Jay P. Kesan including Appendices A-P, Feb. 20, 2017, 776 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' First Amended Answer to Plaintiffs' Third Amended Complaint, provided Aug. 1, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, provided Sep. 9, 2016, 88 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Sonos's Motion to Strike Defendants' New Amended Answer Submitted with their Reply Brief, provided Sep. 15, 2016, 10 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Sonos's Opposition to Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Oct. 31, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. (No. 14-1330-RGA), Defendants' Final Invalidity Contentions (Jan. 18, 2017) (106 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 226, Opinion Denying Inequitable Conduct Defenses, Feb. 6, 2017, updated, 5 pages.

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 242, US District Judge Andrews 101 Opinion, Mar. 13, 2017, 16 pages.

Sonos, Inc. v. D&M Holdings, Sonos Supp Opening Markman Brief including Exhibits, Mar. 3, 2017, 17 pages.

Sonos, Inc. v. D&M Holdings, Sonos Supp Reply Markman Brief including Exhibits, Mar. 29, 2017, 36 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 1: Defendants' Invalidity Contentions for U.S. Pat. No. 7,571,014 filed Sep. 16, 2016, 270 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 10: Defendants' Invalidity Contentions for U.S. Pat. No. 9,219,959 filed Sep. 27, 2016, 236 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 11: Defendants' Invalidity Contentions for U.S. Pat. No. D559,197 filed Sep. 27, 2016, 52 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 2: Defendants' Invalidity Contentions for U.S. Pat. No. 8,588,949 filed Sep. 27, 2016, 224 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 3: Defendants' Invalidity Contentions for U.S. Pat. No. 8,843,224 filed Sep. 27, 2016, 147 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 4: Defendants' Invalidity Contentions for U.S. Pat. No. 8,938,312 filed Sep. 27, 2016, 229 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 5: Defendants' Invalidity Contentions for U.S. Pat. No. 8,938,637 filed Sep. 27, 2016, 213 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 6: Defendants' Invalidity Contentions for U.S. Pat. No. 9,042,556 filed Sep. 27, 2016, 162 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 7: Defendants' Invalidity Contentions for U.S. Pat. No. 9,195,258 filed Sep. 27, 2016, 418 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 8: Defendants' Invalidity Contentions for U.S. Pat. No. 9,202,509 filed Sep. 27, 2016, 331 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions Exhibit 9: Defendants' Invalidity Contentions for U.S. Pat. No. 9,213,357 filed Sep. 27, 2016, 251 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Brief in Support of their Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Oct. 12, 2016, 24 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' Opposition to Sonos's Motion to Strike Defendants' New Amended Answer Submitted with their Reply, provided Oct. 3, 2016, 15 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, provided Oct. 12, 2016, 43 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Exhibit B: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, provided Oct. 12, 2016, 43 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Opening Brief in Support of Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Aug. 1, 2016, 11 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Order, provided Oct. 7, 2016, 2 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff's Opposition to Defendants' Motion for Leave to Amend Their Answer to Add the Defense of Inequitable Conduct, provided Aug. 26, 2016, 25 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Redlined Exhibit B: Defendants' First Amended Answer to Plaintiffs' Third Amended Complaint, provided Aug. 1, 2016, 27 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Reply Brief in Support of Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Nov. 10, 2016, 16 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Reply Brief in Support of Defendants' Motion for Leave to Amend their Answer to Add the Defense of Inequitable Conduct, provided Sep. 9, 2016, 16 pages.

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 206-1, Transcript of 101 Hearing (Nov. 28, 2016) (28 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 207, Public Joint Claim Construction Brief (Nov. 30, 2016) (88 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 214, D&M Post-Markman Letter (Dec. 22, 2016) (13 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 215, Sonos Post-Markman Letter (Dec. 22, 2016) (15 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 219, Claim Construction Opinion (Jan. 12, 2017) (24 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), DI 221, Claim Construction Order (Jan. 18, 2017) (2 pages).

Sonos, Inc. v. D&M Holdings (No. 14-1330-RGA), Markman Hearing Transcript (Dec. 14, 2016) (69 pages).

Understanding Universal Plug and Play, Microsoft White Paper (Jun. 2000) (D+M_0402074-118) (45 pages).

Universal Plug and Play Device Architecture V. 1.0, (Jun. 8, 2000) (54 pages).

Universal Plug and Play in Windows XP, Tom Fout. Microsoft Corporation (Jul. 2001) (D+M_0402041-73) (33 pages).

Universal Plug and Play ("UPnP") AV Architecture:1 for UPnP, Version 1.0, (Jun. 25, 2002) (D+M_0298151-72) (22 pages).

Universal Plug and Play Vendor's Implementation Guide (Jan. 5, 2000) (7 pages).

UPnP AV Architecture:0.83 (Jun. 12, 2002) (SONDM000115483-504) (22 pages).

Advisory Action dated Dec. 28, 2016, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 4 pages.

Chinese Office Action, Office Action dated Dec. 20, 2016, issued in connection with Chinese Application No. 201380044446.8, 16 pages.

Dhir, Amit, "Wireless Home Networks—DECT, Bluetooth, Home RF, and Wireless LANs," XILINX, wp135 (v1.0), Mar. 21, 2001, 18 pages.

European Patent Office, Office Action dated Nov. 25, 2016, issued in connection with EP Application No. 13810340.3, 5 pages.

Final Office Action dated Jan. 12, 2017, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 25 pages.

(56)

References Cited

OTHER PUBLICATIONS

Final Office Action dated Dec. 13, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 41 pages.

Fout, Tom, "Universal Plug and Play (UPnP) Client Support," Microsoft, Aug. 2001, 18 pages.

Japanese Patent Office, Final Office Action dated Nov. 8, 2016, issued in connection with Japanese Patent Application No. 2015-520286, 5 pages.

Japanese Patent Office, Office Action dated Nov. 22, 2016, issued in connection with Japanese Application No. 2015-520288, 6 pages.

Japanese Patent Office, Office Action dated Nov. 29, 2016, issued in connection with Japanese Application No. 2015-516169, 4 pages.

Kou et al., "RenderingControl:1 Service Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 63 pages.

"Linux SDK for UPnP Devices v1.2," Intel Corporation, Jan. 17, 2003, 102 pages.

Non-Final Office Action dated Jan. 3, 2017, issued in connection with U.S. Appl. No. 14/808,875, filed Jul. 24, 2015, 10 pages.

Non-Final Office Action dated Jan. 12, 2017, issued in connection with U.S. Appl. No. 13/895,076, filed May 15, 2013, 10 pages.

Non-Final Office Action dated Nov. 16, 2016, issued in connection with U.S. Appl. No. 15/228,639, filed Aug. 4, 2016, 15 pages.

Non-Final Office Action dated Nov. 29, 2016, issued in connection with U.S. Appl. No. 13/894,179, filed May 14, 2013, 14 pages.

Non-Final Office Action dated Nov. 30, 2016, issued in connection with U.S. Appl. No. 15/243,186, filed Aug. 22, 2016, 12 pages.

Notice of Allowance dated Dec. 1, 2016, issued in connection with U.S. Appl. No. 15/088,283, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/088,532, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/088,678, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/089,758, filed Apr. 4, 2016, 9 pages.

Notice of Allowance dated Dec. 2, 2016, issued in connection with U.S. Appl. No. 15/155,149, filed May 16, 2016, 9 pages.

Notice of Allowance dated Dec. 7, 2016, issued in connection with U.S. Appl. No. 15/156,392, filed May 17, 2016, 9 pages.

Notice of Allowance dated Dec. 13, 2016, issued in connection with U.S. Appl. No. 15/080,591, filed Mar. 25, 2016, 9 pages.

Notice of Allowance dated Dec. 14, 2016, issued in connection with U.S. Appl. No. 15/088,906, filed Apr. 1, 2016, 9 pages.

Notice of Allowance dated Dec. 22, 2016, issued in connection with U.S. Appl. No. 15/080,716, filed Mar. 25, 2016, 9 pages.

Pascoe, Bob, "Salutation Architectures and the newly defined service discovery protocols from Microsoft® and Sun®," Salutation Consortium, White Paper, Jun. 6, 1999, 5 pages.

Ritchie et al., "MediaServer:1 Device Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 12 pages.

Ritchie et al., "UPnP AV Architecture:1, Version 1.0," Contributing Members of the UPnP Forum, Jun. 25, 2002, 22 pages.

Ritchie, John, "MediaRenderer:1 Device Template Version 1.01," Contributing Members of the UPnP Forum, Jun. 25, 2002, 12 pages.

Schulzrinne et al., "RTP: A Transport Protocol for Real-Time Applications," Network Working Group, Jan. 1996, pp. 1-75.

U.S. Appl. No. 60/490,768, filed Jul. 28, 2003, entitled "Method for synchronizing audio playback between multiple networked devices," 13 pages.

U.S. Appl. No. 60/825,407, filed Sep. 12, 2003, entitled "Controlling and manipulating groupings in a multi-zone music or media system," 82 pages.

"UPnP and Sonos Questions," Sonos Community, Dec. 2006, 5 pages.

Yamaha DME 64 Owner's Manual; copyright 2004, 80 pages.

Yamaha DME Designer 3.5 setup manual guide; copyright 2004, 16 pages.

Yamaha DME Designer 3.5 User Manual; Copyright 2004, 507 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Opening Brief in Support of Defendants' Partial Motion for Judgment on the Pleadings for Lack of Patent-Eligible Subject Matter, filed May 6, 2016, 27 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff Sonos, Inc.'s Opening Claim Construction Brief, filed Sep. 9, 2016, 26 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Plaintiff Sonos, Inc.'s Response in Opposition to Defendants' Partial Motion for Judgment on the Pleadings, filed May 27, 2016, 24 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Second Amended Complaint for Patent Infringement, filed Feb. 27, 2015, 49 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Third Amended Complaint for Patent Infringement, filed Jan. 29, 2016, 47 pages.

Sony: AIR-SA 50R Wireless Speaker, Copyright 2009, 2 pages.

Sony: Altus Quick Setup Guide ALT-SA32PC, Copyright 2009, 2 pages.

Sony: BD/DVD Home Theatre System Operating Instructions for BDV-E300, E301 and E801, Copyright 2009, 115 pages.

Sony: BD/DVD Home Theatre System Operating Instructions for BDV-IT1000/BDV-IS1000, Copyright 2008, 159 pages.

Sony: Blu-ray Disc/DVD Home Theatre System Operating Instructions for BDV-IZ1000W, Copyright 2010, 88 pages.

Sony: DVD Home Theatre System Operating Instructions for DAV-DZ380W/DZ680W/DZ880W, Copyright 2009, 136 pages.

Sony: DVD Home Theatre System Operating Instructions for DAV-DZ870W, Copyright 2008, 128 pages.

Sony Ericsson MS500 User Guide, Copyright 2009, 2 pages.

Sony: Home Theatre System Operating Instructions for HT-1S100, Copyright 2008, 168 pages.

Sony: HT-1S100, 5.1 Channel Audio System, last updated Nov. 2009, 2 pages.

Sony: Multi Channel AV Receiver Operating Instructions, 2007, 80 pages.

Sony: Multi Channel AV Receiver Operating Instructions for STR-DN1000, Copyright 2009, 136 pages.

Sony: STR-DN1000, Audio Video Receiver, last updated Aug. 2009, 2 pages.

Sony: Wireless Surround Kit Operating Instructions for WHAT-SA2, Copyright 2010, 56 pages.

Taylor, Marilou, "Long Island Sound," Audio Video Interiors, Apr. 2000, 8 pages.

TOA Corporation, Digital Processor DP-0206 DACsys2000 Version 2.00 Software Instruction Manual, Copyright 2001, 67 pages.

WaveLAN High-Speed Multimode Chip Set, AVAGO0003, Agere Systems, Feb. 2003, 4 pages.

WaveLAN High-Speed Multimode Chip Set, AVAGO0005, Agere Systems, Feb. 2003, 4 pages.

WaveLAN Wireless Integration Developer Kit (WI-DK) for Access Point Developers, AVAGO0054, Agere Systems, Jul. 2003, 2 pages.

WaveLAN Wireless Integration-Developer Kit (WI-DK) Hardware Control Function (HCF), AVAGO0052, Agere Systems, Jul. 2003, 2 pages.

WI-DK Release 2 WaveLAN Embedded Drivers for VxWorks and Linux, AVAGO0056, Agere Systems, Jul. 2003, 2 pages.

WI-DK Release 2 WaveLAN END Reference Driver for VxWorks, AVAGO0044, Agere Systems, Jul. 2003, 4 pages.

WI-DK Release 2 WaveLAN LKM Reference Drivers for Linux, AVAGO0048, Agere Systems, Jul. 2003, 4 pages.

WPA Reauthentication Rates, AVAGO0063, Agere Systems, Feb. 2004, 3 pages.

"884+ Automatic Matrix Mixer Control System," Ivie Technologies, Inc., 2000, pp. 1-4.

Barham et al., "Wide Area Audio Synchronisation", University of Cambridge Computer Laboratory, 1995, 5 pages.

Brassil et al., "Enhancing Internet Streaming Media with Cueing Protocols", 2000, 9 pages.

Cen et al., "A Distributed Real-Time MPEG Video Audio Player", Department of Computer Science and Engineering, Oregon Graduate Institute of Science and Technology, 1995, 12 pages.

Chinese Office Action dated Jul. 5, 2016, issued in connection with Chinese Patent Application No. 201380044380.2, 25 pages.

Dannenberg et al., "A System Supporting Flexible Distributed Real-Time Music Processing", Proceedings of the 2001 International Computer Music Conference, 2001, 4 pages.

(56)

References Cited

OTHER PUBLICATIONS

- Dannenberg; Roger B., "Remote Access to Interactive Media", Proceedings of the SPIE 1785, 1993, 230-237.
- Day, Rebecca, "Going Elan!" Primedia Inc., 2003, 4 pages.
- Fober et al., "Clock Skew Compensation over a High Latency Network," Proceedings of the ICMC, 2002, pp. 548-552.
- Ishibashi et al., "A Comparison of Media Synchronization Quality Among Reactive Control Schemes," IEEE Infocom, 2001, pp. 77-84.
- "A/V Surround Receiver AVR-5800," Denon Electronics, 2000, 2 pages.
- "A/V System Controleer, Owner's Manual," B&K Components, Ltd., 1998, 52 pages.
- "DP-0206 Digital Signal Processor," TOA Electronics, Inc., 2001, pp. 1-12.
- "Home Theater Control Systems," Cinema Source, 2002, 19 pages.
- "Model MRC44 Four Zone—Four Source Audio/Video Controller/Amplifier System," Xantech Corporation, 2002, 52 pages.
- "NexSys Software v. 3 Manual," Crest Audio, Inc., 1997, 76 pages.
- "Residential Distributed Audio Wiring Practices," Leviton Network Solutions, 2001, 13 pages.
- "RVL-6 Modular Multi-Room Controller, Installation & Operation Guide," Nile Audio Corporations, 1999, 46 pages.
- "Systemline Modular Installation Guide, Multiroom System," Systemline, 2003, pp. 1-22.
- "ZR-8630AV MultiZone Audio/Video Receiver, Installation and Operation Guide," Niles Audio Corporation, 2003, 86 pages.
- ZX135: Installation Manual, LA Audio, Apr. 2003, 44 pages.
- Lienhart et al., "On the Importance of Exact Synchronization for Distributed Audio Signal Processing", Session L: Poster Session II—ICASSP'03 Papers, 2002, 1 page.
- Liu et al., "A synchronization control scheme for real-time streaming multimedia applications" Packet Video. 2003, 10 pages, vol. 2003.
- Liu et al., "Adaptive Delay Concealment for Internet Voice Applications with Packet-Based Time-Scale Modification." Information Technologies 2000, pp. 91-102.
- Non-Final Office Action dated Sep. 7, 2016, issued in connection with U.S. Appl. No. 13/864,248, filed Apr. 17, 2013, 12 pages.
- Non-Final Office Action dated Aug. 9, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 31 pages.
- Notice of Allowance dated Aug. 30, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 7 pages.
- Pillai et al., "A Method to Improve the Robustness of MPEG Video Applications over Wireless Networks", Kent Ridge Digital Labs, 2000, 15 pages.
- Rangan et al., "Feedback Techniques for Continuity and Synchronization in Multimedia Information Retrieval", ACM Transactions on Information Systems, 1995, 13(2), 145-176.
- Reid, Mark, "Multimedia conferencing over ISDN and IP networks using ITU-T H-series recommendations: architecture, control and coordination," Computer Networks, 1999, vol. 31, pp. 225-235.
- Rothermel et al., "An Adaptive Protocol for Synchronizing Media Streams", Institute of Parallel and Distributed High-Performance Systems (IPVR), 1997, 26 pages.
- Rothermel et al., "An Adaptive Stream Synchronization Protocol," 5th International Workshop on Network and Operating System Support for Digital Audio and Video, Apr. 18-21, 1995, 12 pages.
- Rothermel et al., "Synchronization in Joint-Viewing Environments", University of Stuttgart Institute of Parallel and Distributed High-Performance Systems, 1992, 13 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 1: Defendants' Invalidity Contentions for U.S. Pat. No. 7,571,014 filed Apr. 15, 2016, 161 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 10: Defendants' Invalidity Contentions for U.S. Pat. No. 9,213,357 filed Apr. 15, 2016, 244 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 2: Defendants' Invalidity Contentions for U.S. Pat. No. 8,588,949 filed Apr. 15, 2016, 112 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 5: Defendants' Invalidity Contentions for U.S. Pat. No. 8,938,637 filed Apr. 15, 2016, 177 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 8: Defendants' Invalidity Contentions for U.S. Pat. No. 9,195,258 filed Apr. 15, 2016, 400 pages.
- Maniactools, "Identify Duplicate Files by Sound," Sep. 28, 2010, <http://www.maniactools.com/soft/music-duplicate-remover/identify-duplicate-files-by-sound.shtml>.
- Mills David L., "Network Time Protocol (Version 3) Specification, Implementation and Analysis," Network Working Group, Mar. 1992, 7 pages.
- Mills, David L., "Precision Synchronization of Computer Network Clocks," ACM SIGCOMM Computer Communication Review, 1994, pp. 28-43, vol. 24, No. 2.
- Motorola., "Simplefi, Wireless Digital Audio Receiver, Installation and User Guide", Dec. 31, 2001, 111 pages.
- Nilsson, M., "ID3 Tag Version 2", Mar. 26, 1998, 28 pages.
- Non-Final Office Action dated May 1, 2014, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 31 pages.
- Non-Final Office Action dated Dec. 5, 2013, issued in connection with U.S. Appl. No. 13/827,653, filed Mar. 14, 2013, 28 pages.
- Non-Final Office Action dated Jan. 5, 2012, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 35 pages.
- Non-Final Office Action dated May 6, 2014, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 23 pages.
- Non-final Office Action dated Apr. 10, 2013, issued in connection with U.S. Appl. No. 13/619,237, filed Sep. 14, 2012, 10 pages.
- Non-Final Office Action dated May 12, 2014, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 23 pages.
- "Non-Final Office Action dated May 14, 2014, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 14 pages".
- "Non-Final Office Action dated Jun. 17, 2014, issued in connection with U.S. Appl. No. 14/176,808, filed Feb. 10, 2014, 6 pages".
- "Non-Final Office Action dated Dec. 18, 2013, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 12 pages".
- "Non-Final Office Action dated Jan. 18, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 28 pages".
- "Non-Final Office Action dated Apr. 19, 2010, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 16 pages".
- "Non-Final Office Action dated Mar. 19, 2013, issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 9 pages".
- "Non-Final Office Action dated Jun. 21, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 13 pages".
- "Non-Final Office Action dated Jan. 22, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 18 pages".
- "Non-Final Office Action dated Jul. 25, 2014, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 9 pages".
- "Non-Final Office Action dated Jul. 25, 2014, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 11 pages".
- "Non-Final Office Action dated Jun. 25, 2010, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 17 pages".
- "Non-Final Office Action dated Nov. 25, 2013, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 19 pages".
- "Non-Final Office Action dated May 27, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 13 pages".
- Non-Final Office Action dated Feb. 29, 2012, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 10 pages.
- "Non-Final Office Action dated Nov. 29, 2010, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 17 pages".
- Non-Final Office Action dated Jul. 30, 2013 issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 7 pages.
- Non-Final Office Action dated Jul. 31, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 31 pages.
- "Non-Final Office Action dated Dec. 1, 2014, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 11 pages".
- "Non-Final Office Action dated Jun. 3, 2015, issued in connection with U.S. Appl. No. 14/564,544, filed Dec. 9, 2014, 7 pages".
- "Non-Final Office Action dated Jun. 4, 2015, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 16 pages".
- "Non-Final Office Action dated Mar. 4, 2015, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 16 pages".

(56)

References Cited**OTHER PUBLICATIONS**

Non-Final Office Action dated Mar. 8, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 13 pages.

"Non-Final Office Action dated Mar. 10, 2011, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 12 pages."

"Non-Final Office Action dated Jun. 12, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 16 pages".

Non-Final Office Action dated Mar. 12, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 13 pages.

Non-Final Office Action dated Jan. 13, 2016, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 14 pages.

"Non-Final Office Action dated Mar. 13, 2015, issued in connection with U.S. Appl. No. 13/705,177, filed Dec. 5, 2012, 15 pages."

"Non-Final Office Action dated Nov. 17, 2014, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 11 pages".

"Non-Final Office Action dated Feb. 18, 2009, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 18 pages."

"Non-Final Office Action dated Nov. 18, 2014, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 10 pages".

"Non-Final Office Action dated Jun. 19, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 38 pages."

"Non-Final Office Action dated Nov. 19, 2014, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 9 pages".

Non-Final Office Action dated Aug. 20, 2009, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 27 pages.

Non-Final Office Action dated Jun. 23, 2015, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 30 pages.

"Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 11 pages".

"Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 11 pages".

"Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 9 pages".

"Non-Final Office Action dated Oct. 24, 2014, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 14 pages".

"Non-Final Office Action dated Feb. 26, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 25 pages."

Non-Final Office Action dated Mar. 26, 2015, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 18 pages.

Non-Final Office Action dated Jun. 27, 2008, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 19 pages.

Non-Final Office Action dated Mar. 27, 2015, issued in connection with U.S. Appl. No. 13/705,178, filed Dec. 5, 2012, 14 pages.

Non-Final Office Action dated Dec. 28, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 29 pages.

Non-Final Office Action dated Apr. 30, 2012, issued in connection with U.S. Appl. No. 13/204,511, filed Aug. 5, 2011, 16 pages.

Non-Final Office Action dated Jan. 30, 2015, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 13 pages.

Non-Final Office Action dated Jan. 30, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 30 pages.

North American MPEG-2 Information, "The MPEG-2 Transport Stream", Retrieved from the Internet:, 2006, pp. 1-5.

Notice of Allowance dated Jan. 31, 2013, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 19 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 17 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 19 pages.

Notice of Allowance dated Jul. 2, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 23 pages.

Notice of Allowance dated Sep. 3, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 4 pages.

Notice of Allowance dated Aug. 4, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 13 pages.

Notice of Allowance dated Oct. 5, 2012, issued in connection with U.S. Appl. No. 13/204,511, filed Aug. 5, 2011, 11 pages.

Notice of Allowance dated Mar. 6, 2014, issued in connection with U.S. Appl. No. 13/827,653, filed Mar. 14, 2013, 17 pages.

Notice of Allowance dated May 6, 2011, issued in connection with U.S. Appl. No. 11/801,468, filed May 9, 2007, 10 pages.

Notice of Allowance dated Sep. 6, 2013, issued in connection with U.S. Appl. No. 13/619,237, filed Sep. 14, 2012, 10 pages.

Notice of Allowance dated Apr. 7, 2016, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 40 pages.

Notice of Allowance dated Oct. 7, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 7 pages.

Notice of Allowance dated Oct. 9, 2015, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 4 pages.

Notice of Allowance dated Aug. 10, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 9 pages.

Notice of Allowance dated Nov. 10, 2011, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 17 pages.

Notice of Allowance dated Apr. 11, 2016, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 21 pages.

Notice of Allowance dated Jan. 11, 2016, issued in connection with U.S. Appl. No. 14/564,544, filed Dec. 9, 2014, 5 pages.

Notice of Allowance dated Aug. 12, 2015, issued in connection with U.S. Appl. No. 13/435,739, filed Mar. 30, 2012, 27 pages.

Notice of Allowance dated Jul. 13, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 22 pages.

Notice of Allowance dated Nov. 13, 2013, issued in connection with U.S. Appl. No. 13/724,048, filed Dec. 21, 2012, 7 pages.

Notice of Allowance dated Oct. 13, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 7 pages.

Notice of Allowance dated Jun. 14, 2012, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 9 pages.

Notice of Allowance dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 18 pages.

Notice of Allowance dated Jun. 16, 2009, issued in connection with U.S. Appl. No. 10/861,653, filed Jun. 5, 2004, 11 pages.

Notice of Allowance dated Jul. 17, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 20 pages.

Notice of Allowance dated May 19, 2015, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 7 pages.

Notice of Allowance dated Sep. 21, 2015, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 11 pages.

Notice of Allowance dated Sep. 22, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 7 pages.

Notice of Allowance dated Sep. 24, 2015, issued in connection with U.S. Appl. No. 13/705,174, filed Dec. 5, 2012, 7 pages.

Notice of Allowance dated Sep. 24, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 7 pages.

Notice of Allowance dated Sep. 25, 2014, issued in connection with U.S. Appl. No. 14/176,808, filed Feb. 10, 2014, 5 pages.

Notice of Allowance dated Aug. 27, 2015, issued in connection with U.S. Appl. No. 13/705,177, filed Dec. 5, 2012, 34 pages.

Notice of Allowance dated Aug. 27, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 18 pages.

Notice of Allowance dated Dec. 27, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 15 pages.

Notice of Allowance dated Jul. 29, 2015, issued in connection with U.S. Appl. No. 13/359,976, filed Jan. 27, 2012, 28 pages.

Notice of Allowance dated Jul. 29, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 9 pages.

Notice of Allowance dated Jul. 30, 2015, issued in connection with U.S. Appl. No. 13/705,178, filed Dec. 5, 2012, 18 pages.

Notice of Allowance dated Aug. 5, 2015, issued in connection with U.S. Appl. No. 13/435,776, filed Mar. 30, 2012, 26 pages.

Notice of Allowance dated Jul. 6, 2015, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 24 pages.

Nutzel et al., "Sharing Systems for Future HiFi Systems", IEEE, 2004, 9 pages.

Palm, Inc., "Handbook for the Palm VII Handheld," May 2000, 311 pages.

Park et al., "Group Synchronization in MultiCast Media Communications," Proceedings of the 5th Research on Multicast Technology Workshop, 2003, 5 pages.

Polycom Conference Composer manual: copyright 2001.

Pre-Interview First Office Action dated Mar. 10, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 4 pages.

(56)

References Cited**OTHER PUBLICATIONS**

Presentations at WinHEC 2000, May 2000, 138 pages.

PRISMIQ; Inc., "PRISMIQ Media Player User Guide", 2003, 44 pages.

Re-Exam Final Office Action dated Aug. 5, 2015, issued in connection with U.S. Appl. No. 90/013,423, filed Jan. 5, 2015, 25 pages.

Re-Exam Non-Final Office Action dated Apr. 22, 2015, issued in connection with U.S. Appl. No. 90/013,423, filed Jan. 5, 2015, 16 pages.

Renkus Heinz Manual; available for sale at least 2004, 6 pages.

Roland Corporation, "Roland announces BA-55 Portable PA System," press release, Apr. 6, 2011, 2 pages.

Rothermel et al., "An Adaptive Stream Synchronization Protocol," 5th International Workshop on Network and Operating System Support for Digital Audio and Video, 1995, 13 pages.

Schmandt et al., "Impromptu: Managing Networked Audio Applications for Mobile Users", 2004, 11 pages.

Schulzrinne H., et al., "RTP: A Transport Protocol for Real-Time Applications, RFC 3550," Network Working Group, 2003, pp. 1-89.

UPnP; "Universal Plug and Play Device Architecture," Jun. 8, 2000; version 1.0; Microsoft Corporation; pp. 1-54.

"Welcome. You're watching Apple TV." Apple TV 1st Generation Setup Guide, Apr. 8, 2008 Retrieved Oct. 14, 2014, 40 pages.

"Welcome. You're watching Apple TV." Apple TV 2nd Generation Setup Guide, Mar. 10, 2011 Retrieved Oct. 16, 2014, 35 pages.

"Welcome. You're watching Apple TV." Apple TV 3rd Generation Setup Guide, Mar. 16, 2012 Retrieved Oct. 16, 2014, 35 pages.

Yamaha DME 32 manual: copyright 2001.

Yamaha DME Designer software manual: Copyright 2004, 482 pages.

Advanced Driver Tab User Interface WaveLan GUI Guide, AVAGO0009, Agere Systems, Feb. 2004, 4 pages.

Agere Systems' Voice-over-Wireless LAN (VoWLAN) Station Quality of Service, AVAGO0015, Agere Systems, Jan. 2005, 5 pages.

Akyildiz et al., "Multimedia Group Synchronization Protocols for Integrated Services Networks," IEEE Journal on Selected Areas in Communications, 1996 pp. 162-173, vol. 14, No. 1.

Audio Authority: How to Install and Use the Model 1154 Signal Sensing Auto Selector, 2002, 4 pages.

Audio Authority: Model 1154B High Definition AV Auto Selector, 2008, 8 pages.

AudioSource: AMP 100 User Manual, 2003, 4 pages.

Automatic Profile Hunting Functional Description, AVAGO0013, Agere Systems, Feb. 2004, 2 pages.

AXIS Communication: AXIS P8221 Network I/O Audio Module, 2009, 41 pages.

Balfanz et al., "Network-in-a-Box: How to Set Up a Secure Wireless Network in Under a Minute", 13th USENIX Security Symposium—Technical Paper, 2002, 23 pages.

Balfanz et al., "Talking to Strangers: Authentication in Ad-Hoc Wireless Networks", Xerox Palo Alto Research Center, 2002, 13 pages.

Bogen Communications, Inc., ProMatrix Digitally Matrixed Amplifier Model PM3180, Copyright 1996, 2 pages.

Breebaart et al., "Multi-Channel Goes Mobile: MPEG Surround Binaural Rendering", AES 29th International Conference, 2006, Sep. 2-4, 1-13.

Change Notification: Agere Systems WaveLan Multimode Reference Design (D2 to D3), AVAGO0042, Agere Systems, Nov. 2004, 2 pages.

Deep-Sleep Implementation in WL60011 for IEEE 802.11b Applications, AVAGO0020, Agere Systems, Jul. 2004, 22 pages.

Denon AV Surround Receiver AVR-1604/684 User's Manual, 2004, 128 pages.

Denon AV Surround Receiver AVR-5800 Operating Instructions, Copyright 2000, 67 pages.

Faller, Christof, "Coding of Spatial Audio Compatible with Different Playback Formats", Audio Engineering Society Convention Paper (Presented at the 117th Convention), 2004, Oct. 28-31, 2004, 12 pages.

Fireball DVD and Music Manager DVDM-100 Installation and User's Guide, Copyright 2003, 185 pages.

Fireball MP-200 User's Manual, Copyright 2006, 93 pages.

Fireball Remote Control Guide WD006-1-1, Copyright 2003, 19 pages.

Fireball SE-D1 User's Manual, Copyright 2005, 90 pages.

Gaston et al., "Methods for Sharing Stereo and Multichannel Recordings Among Planetariums", Audio Engineering Society Convention Paper 7474, 2008, 15 pages.

Herre et al., "The Reference Model Architecture for MPEG Spatial Audio Coding", Audio Engineering Society Convention Paper (Presented at the 118th Convention), May 28-31, 2005, 13 pages.

IBM Home Director Installation and Service Manual, Copyright 1998, 124 pages.

IBM Home Director Owner's Manual, Copyright 1999, 67 pages.

Integra Audio Network Receiver NAC 2.3 Instruction Manual, 68 pages.

Integra Audio Network Server NAS 2.3 Instruction Manual, pp. 1-32.

Integra Service Manual, Audio Network Receiver Model NAC-2.3, Dec. 2002, 44 pages.

Issues with Mixed IEEE 802.b/802.11g Networks, AVAGO0058, Agere Systems, Feb. 2004, 5 pages.

Lake Processors: Lake® LM Series Digital Audio Processors Operation Manual, 2011, 71 pages.

"Denon 2003-2004 Product Catalog," Denon, 2003-2004, 44 pages.

LG: RJP-201M Remote Jack Pack Installation and Setup Guide, 2010, 24 pages.

LinkSys by Cisco, Wireless Home Audio Controller, Wireless-N Touchscreen Remote DMRW1000 Datasheet, Copyright 2008, 2 pages.

LinkSys by Cisco, Wireless Home Audio Controller, Wireless-N Touchscreen Remote DMRW1000 User Guide, Copyright 2008, 64 pages.

LinkSys by Cisco, Wireless Home Audio Player, Wireless-N Music Extender DMP100 Quick Installation Guide, Copyright 2009, 32 pages.

LinkSys by Cisco, Wireless Home Audio Player, Wireless-N Music Extender DMP100 User Guide, Copyright 2008, 65 pages.

Liu et al., "Adaptive Delay Concealment for Internet Voice Applications with Packet-Based Time-Scale Modification." Information Technologies 2000, 4 pages.

Parasound Zpre2 Zone Preamplifier with PTZI Remote Control, 2005, 16 pages.

Proficient Audio Systems M6 Quick Start Guide, 2011, 5 pages.

Proficient Audio Systems: Proficient Editor Advanced Programming Guide, 2007, 40 pages.

Programming Interface for WL54040 Dual-Band Wireless Transceiver, AVAGO0066, Agere Systems, May 2004, 16 pages.

Radio Shack, "Auto-Sensing 4-Way Audio/Video Selector Switch", 2004, 1 page.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 1, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 2, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 3, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 4, 100 pages.

RadioShack, Pro-2053 Scanner, 2002 Catalog, part 5, 46 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Complaint for Patent Infringement, filed Oct. 21, 2014, 20 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Declaration of Steven C. Visser, executed Sep. 9, 2016, 40 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Amended Invalidity Contentions, filed Sep. 14, 2016, 100 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidity Contentions Exhibit 11: Defendants' Invalidity Contentions for U.S. Pat. No. 9,219,959 filed Apr. 15, 2016, 172 pages.

Sonos, Inc. v. D&M Holdings Inc. et al., Defendant's Initial Invalidity Contentions Exhibit 12: Defendants' Invalidity Contentions for U.S. Design Patent No. D559,197 filed Apr. 15, 2016, 36 pages.

(56)

References Cited**OTHER PUBLICATIONS**

- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 3: Defendants' Invalidity Contentions for U.S. Pat. No. 8,843,224 filed Apr. 15, 2016, 118 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 4: Defendants' Invalidity Contentions for U.S. Pat. No. 8,938,312 filed Apr. 15, 2016, 217 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 6: Defendants' Invalidity Contentions for U.S. Pat. No. 9,042,556 filed Apr. 15, 2016, 86 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 7: Defendants' Invalidity Contentions for U.S. Pat. No. 9,130,771 filed Apr. 15, 2016, 203 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions Exhibit 9: Defendants' Invalidity Contentions for U.S. Pat. No. 9,202,509 filed Apr. 15, 2016, 163 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Initial Invalidity Contentions, filed Apr. 15, 2016, 97 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Preliminary Identification of Indefinite Terms, provided Jul. 29, 2016, 8 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendant's Preliminary Identification of Prior Art References, provided Jul. 29, 2016, 5 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendants' Amended Answer, Defenses, and Counterclaims for Patent Infringement, filed Nov. 30, 2015, 47 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendants' Answer to Plaintiff's Second Amended Complaint, filed Apr. 30, 2015, 19 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendants' First Amended Answer to Plaintiffs' Third Amended Complaint, filed Sep. 7, 2016, 23 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Defendants' Reply in Support of Partial Motion for Judgment on the Pleadings, filed Jun. 10, 2016, 15 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Exhibit A: Defendants' Second Amended Answer to Plaintiffs' Third Amended Complaint, filed Sep. 9, 2016, 43 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, First Amended Complaint for Patent Infringement, filed Dec. 17, 2014, 26 pages.
- Sonos, Inc. v. D&M Holdings Inc. et al.*, Joint Claim Construction Chart, vol. 1 of 3 with Exhibits A-O, filed Aug. 17, 2016, 30 pages.
- Advisory Action dated Jun. 9, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 25, 2013, 14 pages.
- Final Office Action dated Jun. 3, 2016, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 24 pages.
- Final Office Action dated May 25, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 33 pages.
- Japanese Patent Office, Office Action dated May 24, 2016, issued in connection with Japanese Patent Application No. 2014-220704, 7 pages.
- Non-Final Office Action dated Jun. 1, 2016, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 21 pages.
- Non-Final Office Action dated May 10, 2016, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 22 pages.
- Advisory Action dated Feb. 2, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 8 pages.
- Advisory Action dated Sep. 18, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 8 pages.
- Advisory Action dated Feb. 1, 2016, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 6 pages.
- Advisory Action dated Jun. 1, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 11 pages.
- Advisory Action dated Mar. 2, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 3 pages.
- Advisory Action dated Jan. 5, 2012, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 3 pages.
- Advisory Action dated Sep. 5, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 3 pages.
- Advisory Action dated Jan. 8, 2015, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 4 pages.
- Advisory Action dated Feb. 10, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 3 pages.
- Advisory Action dated Nov. 12, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 6 pages.
- Advisory Action dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 9 pages.
- Advisory Action dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 9 pages.
- Advisory Action dated Mar. 25, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 5 pages.
- Advisory Action dated Feb. 26, 2015, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 3 pages.
- Advisory Action dated Nov. 26, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 9 pages.
- Advisory Action dated Jul. 28, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 7 pages.
- Advisory Action dated Sep. 28, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 4 pages.
- "AudioTron Quick Start Guide, Version 1.0", Voyetra Turtle Beach, Inc., Mar. 2001, 24 pages.
- "AudioTron Reference Manual, Version 3.0", Voyetra Turtle Beach, Inc., May 2002, 70 pages.
- "AudioTron Setup Guide, Version 3.0", Voyetra Turtle Beach, Inc., May 2002, 38 pages.
- Baldwin, Roberto. "How-To: Setup iTunes DJ on Your Max and iPhone", available at http://www.maclife.com/article/howtos/howto_setup_itunes_dj_your_mac_and_iphone, archived on Mar. 17, 2009, 4 pages.
- Baudisch et al., "Flat Volume Control: Improving Usability by Hiding the Volume Control Hierarchy in the User Interface", 2004, 8 pages.
- Benslimane Abderrahim, "A Multimedia Synchronization Protocol for Multicast Groups," Proceedings of the 26th Euromicro Conference, 2000, pp. 456-463, vol. 1.
- Biersack et al., "Intra- and Inter-Stream Synchronization for Stored Multimedia Streams," IEEE International Conference on Multimedia Computing and Systems, 1996, pp. 372-381.
- Blakowski G. et al., "A Media Synchronization Survey: Reference Model, Specification, and Case Studies", Jan. 1996, vol. 14, No. 1, 5-35.
- Bluetooth. "Specification of the Bluetooth System: The ad hoc SCATTERNET for affordable and highly functional wireless connectivity," Core, Version 1.0 A, Jul. 26, 1999, 1068 pages.
- Bluetooth. "Specification of the Bluetooth System: Wireless connections made easy," Core, Version 1.0 B, Dec. 1, 1999, 1076 pages.
- Bretl W.E., et al., MPEG2 Tutorial [online], 2000 [retrieved on Jan. 13, 2009] Retrieved from the Internet, pp. 1-23.
- Canadian Intellectual Property Office, Canadian Office Action dated Apr. 4, 2016, issued in connection with Canadian Patent Application No. 2,842,342, 5 pages.
- Canadian Intellectual Property Office, Canadian Office Action dated Sep. 14, 2015, issued in connection with Canadian Patent Application No. 2,842,342, 2 pages.
- Chakrabarti et al., "A Remotely Controlled Bluetooth Enabled Environment", IEEE, 2004, pp. 77-81.
- Corrected Notice of Allowance dated Aug. 19, 2015, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 2 pages.
- Creative, "Connecting Bluetooth Devices with Creative D200," <http://support.creative.com/kb/ShowArticle.aspx?url=http://ask.creative.com:80/SRVS/CGI-BIN/WEB CGI.EXE/?St=106,E=0000000000396859016,K=9377,Sxi=8,VARSET=ws:http://us.creative.com,case=63350>, available on Nov. 28, 2011, 2 pages.
- Crown PIP Manual available for sale at least 2004, 68 pages.
- Dell, Inc. "Dell Digital Audio Receiver: Reference Guide," Jun. 2000, 70 pages.
- Dell, Inc. "Start Here," Jun. 2000, 2 pages.
- European Extended Search Report dated Feb. 28, 2014, issued in connection with EP Application No. 13184747.7, 8 pages.
- European Extended Search Report dated Mar. 7, 2016, issued in connection with EP Application No. 13810340.3, 9 pages.

(56)

References Cited**OTHER PUBLICATIONS**

European Extended Search Report dated Mar. 31, 2015, issued in connection with EP Application No. 14181454.1, 9 pages.

European Patent Office, Examination Report dated Mar. 22, 2016, issued in connection with European Patent Application No. EP14181454.1, 6 pages.

Falcone, John, "Sonos BU150 Digital Music System review," CNET, CNET [online] Jul. 27, 2009 [retrieved on Mar. 16, 2016], 11 pages Retrieved from the Internet: URL:<http://www.cnet.com/products/sonos-bu150-digital-music-system/>.

Final Office Action dated Jun. 5, 2014, issued in connection with U.S. Appl. No. 13/907,666, filed May 31, 2013, 12 pages.

Final Office Action dated Jul. 13, 2009, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 16 pages.

Final Office Action dated Sep. 13, 2012, issued in connection with U.S. Appl. No. 13/297,000, filed Nov. 15, 2011, 17 pages.

Final Office Action dated Nov. 18, 2015, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 56 pages.

Final Office Action dated Oct. 21, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 19 pages.

Final Office Action dated Mar. 27, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 29 pages.

Final Office Action dated Jan. 28, 2011, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 21 pages.

Final Office Action dated Jun. 30, 2008, issued in connection with U.S. Appl. No. 10/816,217, filed Apr. 1, 2004, 30 pages.

Final Office Action dated Aug. 3, 2015, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 13 pages.

Final Office Action dated Dec. 3, 2014, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 12 pages.

Final Office Action dated Jul. 3, 2012, issued in connection with U.S. Appl. No. 13/298,090, filed Nov. 16, 2011, 41 pages.

Final Office Action dated Mar. 3, 2015, issued in connection with U.S. Appl. No. 13/864,251, filed Apr. 17, 2013, 13 pages.

Final Office Action dated Mar. 4, 2015, issued in connection with U.S. Appl. No. 13/848,904, filed Mar. 22, 2013, 16 pages.

Final Office Action dated Mar. 5, 2015, issued in connection with U.S. Appl. No. 13/888,203, filed May 6, 2013, 13 pages.

Final Office Action dated Jan. 7, 2015, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 14 pages.

Final Office Action dated Mar. 9, 2015, issued in connection with U.S. Appl. No. 14/516,867, filed Oct. 17, 2014, 14 pages.

Final Office Action dated Aug. 10, 2015, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 26 pages.

Final Office Action dated Aug. 11, 2015, issued in connection with U.S. Appl. No. 13/864,247, filed Apr. 17, 2013, 15 pages.

Final Office Action dated Feb. 11, 2015, issued in connection with U.S. Appl. No. 14/184,526, filed Feb. 19, 2014, 13 pages.

Final Office Action dated Feb. 11, 2015, issued in connection with U.S. Appl. No. 14/184,935, filed Feb. 20, 2014, 17 pages.

Final Office Action dated Feb. 12, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 20 pages.

Final Office Action dated Oct. 13, 2011, issued in connection with U.S. Appl. No. 12/035,112, filed Feb. 21, 2008, 10 pages.

Final Office Action dated Jul. 15, 2015, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 18 pages.

Final Office Action dated Jun. 15, 2015, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 25 pages.

Final Office Action dated Dec. 17, 2014, issued in connection with U.S. Appl. No. 13/533,105, filed Jun. 26, 2012, 36 pages.

Final Office Action dated Jan. 21, 2010, issued in connection with U.S. Appl. No. 11/906,702, filed Oct. 2, 2007, 27 pages.

Final Office Action dated Oct. 22, 2014, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 12 pages.

Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 23 pages.

Final Office Action dated Feb. 24, 2016, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 28 pages.

Final Office Action dated Apr. 28, 2015, issued in connection with U.S. Appl. No. 14/186,850, filed Feb. 21, 2014, 20 pages.

Final Office Action dated Nov. 30, 2015, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 26 pages.

First Action Interview Office Action Summary dated Apr. 15, 2015, issued in connection with U.S. Appl. No. 14/505,027, filed Oct. 2, 2014, 6 pages.

Fulton et al., "The Network Audio System: Make Your Application Sing (As Well As Dance)!", The X Resource, 1994, 14 pages.

Hans et al., "Interacting with Audio Streams for Entertainment and Communication", Proceedings of the Eleventh ACM International Conference on Multimedia, ACM, 2003, 7 pages.

Horwitz, Jeremy, "Logic3 i-Station25," retrieved from the internet: <http://www.ilounge.com/index.php/reviews/entry/logic3-i-station25/>, last visited Dec. 17, 2013, 5 pages.

Huang C.M., et al., "A Synchronization Infrastructure for Multicast Multimedia at the Presentation Layer," IEEE Transactions on Consumer Electronics, 1997, pp. 370-380, vol. 43, No. 3.

International Bureau, International Preliminary Report on Patentability, dated Jan. 8, 2015, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 6 pages.

International Bureau, International Preliminary Report on Patentability, dated Jan. 8, 2015, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 8 pages.

International Bureau, International Preliminary Report on Patentability dated Jan. 30, 2014, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 6 pages.

International Searching Authority, International Search Report dated Aug. 1, 2008, in connection with International Application No. PCT/US2004/023102, 5 pages.

International Searching Authority, International Search Report dated Dec. 26, 2012, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 3 pages.

International Searching Authority, International Search Report, dated Sep. 30, 2013, issued in connection with PCT Application No. PCT/US2013/046386, 3 pages.

International Searching Authority, International Search Report dated Aug. 26, 2013, issued in connection with International Patent application No. PCT/US2013/046372, 3 pages.

International Searching Authority, Written Opinion dated Aug. 26, 2013, issued in connection with International Application No. PCT/US2013/046372, filed on Jun. 18, 2013, 4 pages.

International Searching Authority, Written Opinion dated Dec. 26, 2012, issued in connection with International Application No. PCT/US2012/045894, filed on Jul. 9, 2012, 4 pages.

International Searching Authority, Written Opinion dated Sep. 30, 2013, issued in connection with International Application No. PCT/US2013/046386, filed on Jun. 18, 2013, 6 pages.

Ishibashi et al., "A Group Synchronization Mechanism for Live Media in Multicast Communications," IEEE Global Telecommunications Conference, 1997, pp. 746-752, vol. 2.

Ishibashi et al., "A Group Synchronization Mechanism for Stored Media in Multicast Communications," IEEE Information Revolution and Communications, 1997, pp. 692-700, vol. 2.

Japanese Intellectual Property Office, Decision of Rejection dated Jul. 8, 2014, issued in connection with Japanese Patent Application No. 2012-178711, 3 pages.

Japanese Intellectual Property Office, Office Action Summary dated Feb. 2, 2016, issued in connection with Japanese Patent Application No. 2015-520286, 6 pages.

Japanese Intellectual Property Office, Office Action Summary dated Nov. 19, 2013, issued in connection with Japanese Patent Application No. 2012-178711, 5 pages.

Japanese Patent Office, Notice of Rejection, dated Feb. 3, 2015, issued in connection with Japanese Patent Application No. 2014-521648, 7 pages.

Japanese Patent Office, Notice of Rejection dated Sep. 15, 2015, issued in connection with Japanese Patent Application No. 2014-220704, 7 pages.

Japanese Patent Office, Office Action dated Mar. 29, 2016, issued in connection with Japanese Patent Application No. JP2015-520288, 12 pages.

(56)

References Cited**OTHER PUBLICATIONS**

Jo et al., "Synchronized One-to-many Media Streaming with Adaptive Playout Control," Proceedings of SPIE, 2002, pp. 71-82, vol. 4861.

Jones, Stephen, "Dell Digital Audio Receiver: Digital upgrade for your analog stereo" Analog Stereo Jun. 24, 2000 retrieved Jun. 18, 2014, 2 pages.

Levergood et al., "AudioFile: A Network-Transparent System for Distributed Audio Applications", Digital Equipment Corporation, 1993, 109 pages.

Louderback, Jim, "Affordable Audio Receiver Furnishes Homes With MP3," TechTV Vault. Jun. 28, 2000 retrieved Jul. 10, 2014, 2 pages.

Advisory Action dated Mar. 8, 2017, issued in connection with U.S. Appl. No. 13/871,795, filed Apr. 26, 2013, 22 pages.

AVTransport:1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (66 pages).

Chinese Patent Office, Second Office Action dated Feb. 27, 2017, issued in connection with Chinese Patent Application No. 201380044380.2, 22 pages.

Connection Manager: 1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (25 pages).

ContentDirectory:1 Service Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (89 pages).

Designing a UPnP AV MediaServer, Nelson Kidd (2003) (SONDM000115062-116) (55 pages).

Final Office Action dated Jun. 2, 2017, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 32 pages.

Final Office Action dated Apr. 10, 2017, issued in connection with U.S. Appl. No. 15/243,355, filed Aug. 22, 2016, 15 pages.

Final Office Action dated May 15, 2017, issued in connection with U.S. Appl. No. 13/864,252, filed Apr. 17, 2013, 13 pages.

Final Office Action dated May 16, 2017, issued in connection with U.S. Appl. No. 13/864,249, filed Apr. 17, 2013, 14 pages.

Final Office Action dated May 16, 2017, issued in connection with U.S. Appl. No. 13/864,250, filed Apr. 17, 2013, 12 pages.

Final Office Action dated Apr. 20, 2017, issued in connection with U.S. Appl. No. 13/864,248, filed Apr. 17, 2013, 14 pages.

Fries et al. "The MP3 and Internet Audio Handbook: Your Guide to the Digital Music Revolution." 2000, 320 pages.

General Event Notification Architecture Base: Client to Arbiter (Apr. 2000) (23 pages).

Home Networking with Universal Plug and Play, IEEE Communications Magazine, vol. 39 No. 12 (Dec. 2001) (D+M_0402025-40) (16 pages).

Implicit, LLC v. Sonos, Inc. (No. 14-1330-RGA), Defendant's Original Complaint (Mar. 3, 2017) (15 pages).

Intel Designing a UPnP AV Media Renderer, v. 1.0 ("Intel AV Media Renderer") (May 20, 2003) (SONDM000115117-62) (46 pages).

Intel Media Renderer Device Interface ("Intel Media Renderer") (Sep. 6, 2002) (62 pages).

Intel SDK for UPnP Devices Programming Guide, Version 1.2.1, (Nov. 2002) (30 pages).

Linux SDK for UPnP Devices v. 1.2 (Sep. 6, 2002) (101 pages).

MediaRenderer:1 Device Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (12 pages).

MediaServer:1 Device Template Version 1.01 for UPnP, Version 1.0 (Jun. 25, 2002) (12 pages).

Microsoft, Universal Plug and Play (UPnP) Client Support ("Microsoft UPnP") (Aug. 2001) (D+M_0402007-24) (18 pages).

Microsoft Windows XP Reviewer's Guide (Aug. 2001) (D+M_0402225-85) (61 pages).

"Microsoft Windows XP File and Printer Share with Microsoft Windows" Microsoft Windows XP Technical Article, 2003, 65 pages.

"SMPTE Made Simple: A Time Code Tutor by Timeline," 1996, 46 pages.

Network Time Protocol (NTP), RFC 1305 (Mar. 1992) (D+M_0397417-536) (120 pages).

Niederst, Jennifer "O'Reilly Web Design in a Nutshell," Second Edition, Sep. 2001, 678 pages.

Non-Final Office Action dated Apr. 10, 2017, issued in connection with U.S. Appl. No. 13/871,785, filed Apr. 26, 2013, 10 pages.

Non-Final Office Action dated Apr. 20, 2017, issued in connection with U.S. Appl. No. 90/013,882, filed Dec. 27, 2016, 197 pages.

Notice of Allowance dated Jun. 1, 2017, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 12 pages.

Notice of Allowance dated Apr. 3, 2017, issued in connection with U.S. Appl. No. 15/088,678, filed Apr. 1, 2016, 8 pages.

Notice of Allowance dated Mar. 9, 2017, issued in connection with U.S. Appl. No. 15/080,591, filed Mar. 25, 2016, 7 pages.

Notice of Allowance dated Feb. 10, 2017, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 13 pages.

Notice of Allowance dated Mar. 15, 2017, issued in connection with U.S. Appl. No. 15/080,716, filed Mar. 25, 2016, 7 pages.

Notice of Allowance dated Apr. 25, 2017, issued in connection with U.S. Appl. No. 15/156,392, filed May 17, 2016, 8 pages.

Notice of Allowance dated Mar. 27, 2017, issued in connection with U.S. Appl. No. 15/089,758, filed Apr. 4, 2016, 7 pages.

Notice of Allowance dated Mar. 28, 2017, issued in connection with U.S. Appl. No. 15/088,906, filed Apr. 1, 2016, 7 pages.

Notice of Allowance dated Mar. 28, 2017, issued in connection with U.S. Appl. No. 15/155,149, filed May 16, 2016, 7 pages.

Request for Ex Parte Reexamination submitted in U.S. Pat. No. 9,213,357 on May 22, 2017, 85 pages.

RenderingControl:1 Service Template Version 1.01 for UPnP, Version 1.0, (Jun. 25, 2002) (SONDM000115187-249) (63 pages).

Notice of Allowance dated Mar. 30, 2017, issued in connection with U.S. Appl. No. 15/088,532, filed Apr. 1, 2016, 7 pages.

Notice of Allowance dated Apr. 6, 2017, issued in connection with U.S. Appl. No. 15/088,283, filed Apr. 1, 2016, 7 pages.

Notice of Incomplete Re-Exam Request dated May 25, 2017, issued in connection with U.S. Appl. No. 90/013,959, filed Apr. 1, 2016, 10 pages.

Pre-Brief Conference Decision dated May 11, 2017, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 2 pages.

Real Time Control Protocol (RTCP) and Realtime Transfer Protocol (RTP), RFC 1889 (Jan. 1996) (D+M_0397810-84) (75 pages).

Realtime Streaming Protocol (RTSP), RFC 2326 (Apr. 1998) (D+M_0397945-8036) (92 pages).

Realtime Transport Protocol (RTP), RFC 3550 (Jul. 2003) (D+M_0398235-323) (89 pages).

Advisory Action dated Jun. 20, 2017, issued in connection with U.S. Appl. No. 15/243,355, filed Aug. 22, 2016, 5 pages.

Final Office Action dated Jul. 11, 2017, issued in connection with U.S. Appl. No. 15/243,186, filed Aug. 22, 2016, 13 pages.

Final Office Action dated Jun. 15, 2017, issued in connection with U.S. Appl. No. 15/228,639, filed Aug. 4, 2016, 16 pages.

Final Office Action dated Jun. 28, 2017, issued in connection with U.S. Appl. No. 14/808,875, filed Jul. 24, 2015, 14 pages.

First Action Pre-Interview Office Action dated Jun. 22, 2017, issued in connection with U.S. Appl. No. 14/516,883, filed Oct. 17, 2014, 5 pages.

Non-Final Office Action dated Jul. 11, 2017, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 10 pages.

Non-Final Office Action dated Jul. 26, 2017, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 14 pages.

Notice of Allowance dated Jul. 12, 2017, issued in connection with U.S. Appl. No. 13/894,179, filed May 14, 2013, 10 pages.

Notice of Allowance dated Jul. 13, 2017, issued in connection with U.S. Appl. No. 13/895,076, filed May 15, 2013, 10 pages.

Renewed Request for Ex Parte Re-Examination, U.S. Appl. No. 90/013,959, filed Jun. 16, 2017, 126 pages.

European Patent Office, Examination Report dated Oct. 24, 2016, issued in connection with European Patent Application No. 13808623.6, 4 pages.

"Final Office Action dated Oct. 19, 2016, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 14 pages".

Non-Final Office Action dated Nov. 3, 2016, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 17 pages.

(56)

References Cited**OTHER PUBLICATIONS**

Non-Final Office Action dated Oct. 4, 2016, issued in connection with U.S. Appl. No. 15/089,758, filed Apr. 4, 2016, 9 pages.

Non-Final Office Action dated Nov. 5, 2016, issued in connection with U.S. Appl. No. 13/864,250, filed Apr. 17, 2013, 10 pages.

Non-Final Office Action dated Oct. 5, 2016, issued in connection with U.S. Appl. No. 13/864,252, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Oct. 6, 2016, issued in connection with U.S. Appl. No. 15/088,678, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Oct. 7, 2016, issued in connection with U.S. Appl. No. 15/156,392, filed May 17, 2016, 8 pages.

Non-Final Office Action dated Nov. 10, 2016, issued in connection with U.S. Appl. No. 15/243,355, filed Aug. 22, 2016, 11 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/080,591, filed Mar. 25, 2016, 9 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/080,716, filed Mar. 25, 2016, 8 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/088,283, filed Apr. 1, 2016, 8 pages.

Non-Final Office Action dated Sep. 21, 2016, issued in connection with U.S. Appl. No. 15/088,532, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Sep. 22, 2016, issued in connection with U.S. Appl. No. 15/088,906, filed Apr. 1, 2016, 9 pages.

Non-Final Office Action dated Sep. 22, 2016, issued in connection with U.S. Appl. No. 15/155,149, filed May 16, 2016, 7 pages.

Non-Final Office Action dated Sep. 30, 2016, issued in connection with U.S. Appl. No. 13/864,249, filed Apr. 17, 2013, 12 pages.

Notice of Allowance dated Oct. 19, 2016, issued in connection with U.S. Appl. No. 14/290,493, filed May 29, 2014, 14 pages.

Advisory Action dated Nov. 1, 2013, issued in connection with U.S. Appl. No. 13/618,829, filed Sep. 14, 2012, 3 pages.

Advisory Action dated Aug. 10, 2017, issued in connection with U.S. Appl. No. 13/864,250, filed Apr. 17, 2013, 3 pages.

Advisory Action dated Jan. 10, 2018, issued in connection with U.S. Appl. No. 13/871,785, filed Apr. 26, 2013, 3 pages.

Advisory Action dated Jun. 11, 2018, issued in connection with U.S. Appl. No. 90/013,959, filed Jun. 16, 2017, 3 pages.

Advisory Action dated Aug. 16, 2017, issued in connection with U.S. Appl. No. 13/864,248, filed Apr. 17, 2013, 5 pages.

Advisory Action dated Aug. 22, 2017, issued in connection with U.S. Appl. No. 13/864,249, filed Apr. 17, 2013, 3 pages.

Advisory Action dated Sep. 22, 2017, issued in connection with U.S. Appl. No. 15/243,186, filed Aug. 22, 2016, 3 pages.

Advisory Action dated Apr. 27, 2016, issued in connection with U.S. Appl. No. 14/486,667, filed Sep. 15, 2014, 7 pages.

Canadian Patent Office, Office Action dated Jul. 10, 2018, issued in connection with Canadian Application No. 2982726, 3 pages.

Corrected Notice of Allowability dated Dec. 23, 2016, issued in connection with U.S. Appl. No. 14/803,953, filed Jul. 20, 2015, 18 pages.

European Patent Office, European Office Action dated Sep. 1, 2017, issued in connection with European Application No. 13184747.7, 7 pages.

European Patent Office, Summons to Attend Oral Proceedings dated Jul. 10, 2018, issued in connection with European Application No. 13184747.7, 10 pages.

File History of Re-Examination U.S. Appl. No. 90/013,423 (Sonos Ref No. 12-0902-REX).

Final Office Action dated Jul. 5, 2013, issued in connection with U.S. Appl. No. 13/618,829, filed Sep. 14, 2012, 22 pages.

Final Office Action dated Jun. 6, 2018, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 14 pages.

Final Office Action dated Mar. 8, 2017, issued in connection with U.S. Appl. No. 14/486,667, filed Sep. 15, 2014, 39 pages.

Final Office Action dated Nov. 8, 2017, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 13 pages.

Final Office Action dated Nov. 8, 2017, issued in connection with U.S. Appl. No. 13/871,785, filed Apr. 26, 2013, 12 pages.

Final Office Action dated Mar. 1, 2018, issued in connection with U.S. Appl. No. 13/705,176, filed Dec. 5, 2012, 16 pages.

Final Office Action dated Jul. 11, 2018, issued in connection with U.S. Appl. No. 13/864,249, filed Apr. 17, 2013, 13 pages.

Final Office Action dated Jul. 11, 2018, issued in connection with U.S. Appl. No. 13/864,252, filed Apr. 17, 2013, 10 pages.

Final Office Action dated Aug. 14, 2009, issued in connection with U.S. Appl. No. 11/147,116, filed Jun. 6, 2005, 28 pages.

Final Office Action dated Feb. 15, 2018, issued in connection with U.S. Appl. No. 14/516,883, filed Oct. 17, 2014, 17 pages.

Final Office Action dated Mar. 16, 2011, issued in connection with U.S. Appl. No. 11/147,116, filed Jun. 6, 2005, 40 pages.

Final Office Action dated Mar. 16, 2018, issued in connection with U.S. Appl. No. 90/013,959, filed Jun. 16, 2017, 39 pages.

Final Office Action dated May 16, 2018, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 11 pages.

Final Office Action dated Dec. 24, 2009, issued in connection with U.S. Appl. No. 11/147,116, filed Jun. 6, 2005, 29 pages.

Final Office Action dated Mar. 29, 2018, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 24 pages.

Final Office Action dated Dec. 31, 2015, issued in connection with U.S. Appl. No. 14/486,667, filed Sep. 15, 2014, 34 pages.

First Office Action Interview dated Aug. 30, 2017, issued in connection with U.S. Appl. No. 14/516,883, filed Oct. 17, 2014, 5 pages.

Japanese Patent Office, Japanese Office Action dated Oct. 3, 2017, issued in connection with Japanese Application No. 2016-163042, 5 pages.

Japanese Patent Office, Office Action dated May 15, 2018, issued in connection with Japanese Application No. 2016-163042, 6 pages.

Japanese Patent Office, Translation of Office Action dated May 15, 2018, issued in connection with Japanese Application No. 2016-163042, 4 pages.

Non-Final Office Action dated Sep. 1, 2010, issued in connection with U.S. Appl. No. 11/147,116, filed Jun. 6, 2005, 36 pages.

Non-Final Office Action dated Nov. 2, 2016, issued in connection with U.S. Appl. No. 14/486,667, filed Sep. 15, 2014, 37 pages.

Non-Final Office Action dated Feb. 3, 2009, issued in connection with U.S. Appl. No. 11/147,116, filed Jun. 6, 2005, 32 pages.

Non-Final Office Action dated Oct. 3, 2014, issued in connection with U.S. Appl. No. 13/863,083, filed Apr. 15, 2013, 22 pages.

Non-Final Office Action dated Nov. 7, 2011, issued in connection with U.S. Appl. No. 11/147,116, filed Jun. 6, 2005, 48 pages.

Non-Final Office Action dated Jan. 10, 2018, issued in connection with U.S. Appl. No. 13/848,932, filed Mar. 22, 2013, 18 pages.

Non-Final Office Action dated Nov. 13, 2017, issued in connection with U.S. Appl. No. 13/864,249, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Dec. 14, 2017, issued in connection with U.S. Appl. No. 15/081,911, filed Mar. 27, 2016, 17 pages.

Non-Final Office Action dated Nov. 14, 2017, issued in connection with U.S. Appl. No. 13/864,252, filed Apr. 17, 2013, 11 pages.

Non-Final Office Action dated Aug. 15, 2017, issued in connection with U.S. Appl. No. 14/184,522, filed Feb. 19, 2014, 11 pages.

Non-Final Office Action dated Jul. 15, 2016, issued in connection with U.S. Appl. No. 14/803,953, filed Jul. 20, 2015, 20 pages.

Non-Final Office Action dated Nov. 15, 2017, issued in connection with U.S. Appl. No. 15/228,639, filed Aug. 4, 2016, 14 pages.

Non-Final Office Action dated Nov. 15, 2017, issued in connection with U.S. Appl. No. 15/243,186, filed Aug. 22, 2016, 13 pages.

Non-Final Office Action dated Aug. 17, 2017, issued in connection with U.S. Appl. No. 14/184,528, filed Feb. 19, 2014, 12 pages.

Non-Final Office Action dated Jan. 18, 2013, issued in connection with U.S. Appl. No. 13/618,829, filed Sep. 14, 2012, 58 pages.

Non-Final Office Action dated Apr. 2, 2018, issued in connection with U.S. Appl. No. 15/243,355, filed Aug. 22, 2016, 20 pages.

Non-Final Office Action dated Oct. 20, 2017, issued in connection with U.S. Appl. No. 90/013,959, filed Jun. 16, 2017, 50 pages.

Non-Final Office Action dated Oct. 23, 2014, issued in connection with U.S. Appl. No. 13/932,864, filed Jul. 1, 2013, 20 pages.

Non-Final Office Action dated Apr. 24, 2018, issued in connection with U.S. Appl. No. 15/095,145, filed Apr. 10, 2016, 13 pages.

Non-Final Office Action dated Aug. 28, 2017, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 17 pages.

Non-Final Office Action dated Nov. 28, 2017, issued in connection with U.S. Appl. No. 13/864,248, filed Apr. 17, 2013, 12 pages.

(56)

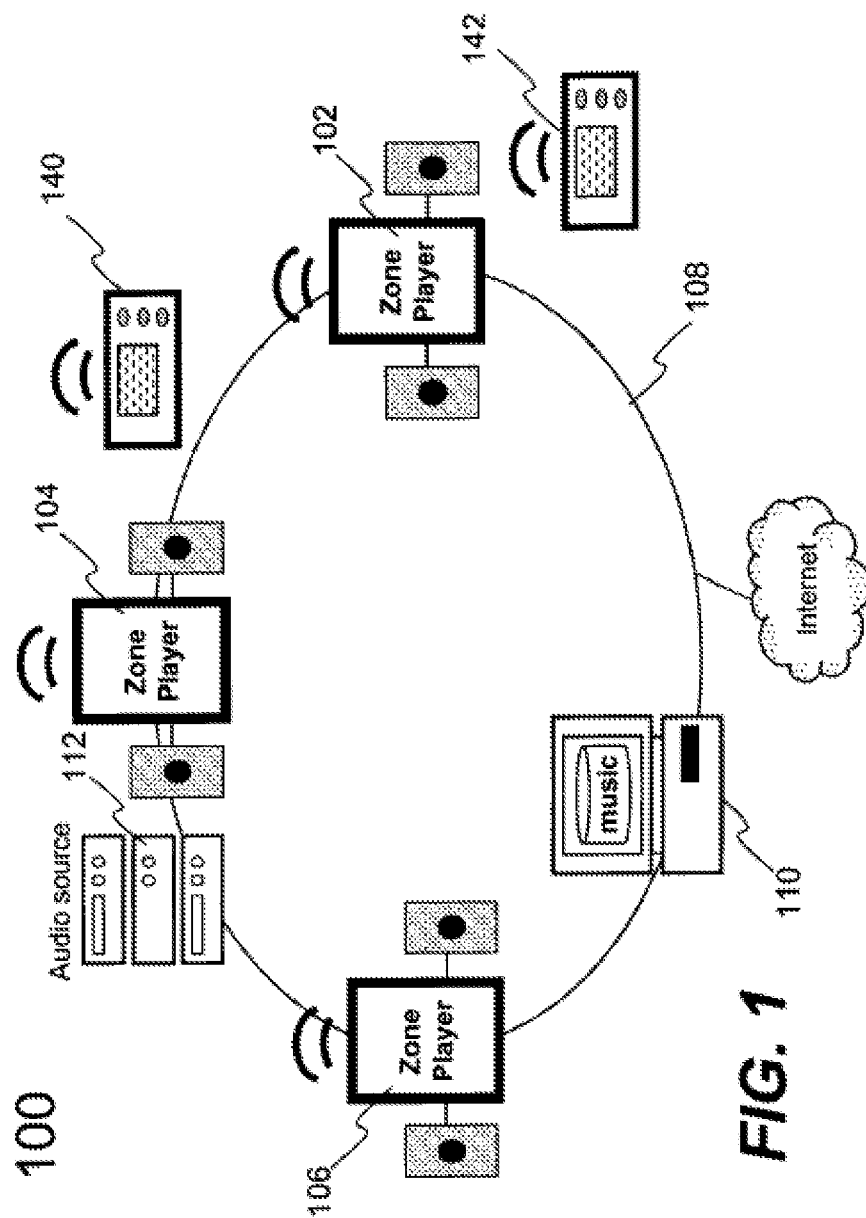
References Cited

OTHER PUBLICATIONS

Non-Final Office Action dated Aug. 29, 2017, issued in connection with U.S. Appl. No. 14/058,166, filed Oct. 18, 2013, 12 pages.
 Non-Final Office Action dated Jul. 30, 2018, issued in connection with U.S. Appl. No. 16/009,182, filed Jun. 14, 2018, 22 pages.
 Non-Final Office Action dated Dec. 31, 2013, issued in connection with U.S. Appl. No. 13/618,829, filed Sep. 14, 2012, 26 pages.
 Non-Final Office Action dated Jan. 9, 2018, issued in connection with U.S. Appl. No. 13/864,250, filed Apr. 17, 2013, 13 pages.
 Notice of Allowance dated Jun. 2, 2017, issued in connection with U.S. Appl. No. 14/486,667, filed Sep. 15, 2014, 10 pages.
 Notice of Allowance dated Jul. 6, 2018, issued in connection with U.S. Appl. No. 14/058,166, filed Oct. 18, 2013, 19 pages.
 Notice of Allowance dated Aug. 10, 2018, issued in connection with U.S. Appl. No. 15/081,911, filed Mar. 27, 2016, 5 pages.
 Notice of Allowance dated Jul. 10, 2018, issued in connection with U.S. Appl. No. 14/504,812, filed Oct. 2, 2014, 9 pages.
 Notice of Allowance dated May 10, 2018, issued in connection with U.S. Appl. No. 13/864,248, filed Apr. 17, 2013, 8 pages.
 Notice of Allowance dated Aug. 14, 2012, issued in connection with U.S. Appl. No. 11/147,116, filed Jun. 6, 2005, 33 pages.
 Notice of Allowance dated Jul. 18, 2014, issued in connection with U.S. Appl. No. 13/618,829, filed Sep. 14, 2012, 8 pages.
 Notice of Allowance dated Nov. 23, 2016, issued in connection with U.S. Appl. No. 14/803,953, filed Jul. 20, 2015, 21 pages.

Notice of Allowance dated Apr. 27, 2015, issued in connection with U.S. Appl. No. 13/932,864, filed Jul. 1, 2013, 20 pages.
 Notice of Allowance dated Jun. 27, 2018, issued in connection with U.S. Appl. No. 13/848,921, filed Mar. 22, 2013, 19 pages.
 Notice of Allowance dated Apr. 29, 2015, issued in connection with U.S. Appl. No. 13/863,083, filed Apr. 15, 2013, 19 pages.
 Notice of Allowance dated Mar. 29, 2017, issued in connection with U.S. Appl. No. 14/803,953, filed Jul. 20, 2015, 8 pages.
 Notice of Allowance dated Jan. 31, 2018, issued in connection with U.S. Appl. No. 13/871,785, filed Apr. 26, 2013, 6 pages.
 Notice of Intent to Issue Re-Examination Certificate dated Aug. 3, 2017, issued in connection with U.S. Appl. No. 90/013,882, filed Dec. 27, 2016, 20 pages.
 "Sonos Multi-Room Music System User Guide," Version 090401, Sonos, Inc. Apr. 1, 2009, 256 pages.
 Pro Tools Reference Guide Version 5.3 Manual, 2002, 582 pages.
 Reexam Non-Final Office Action dated Nov. 9, 2016, issued in connection with U.S. Appl. No. 90/013,774, filed Jun. 29, 2016, 35 pages.
 Solid State Logic G Series Systems Operator's Shortform Guide: SSL G Series Console, 1994, 49 pages.
 Solid State Logic SL 9000 J Series Total Studio System: Console Operator's Manual, 1994, 415 pages.
Sonos, Inc. v. D&M Holdings Inc. et al., Defendants' 35 U.S.C. § 282 Notice filed Nov. 2, 2017, 31 pages.
 Sonos System Overview, Version 1.0, Jul. 2011, 12 pages.

* cited by examiner



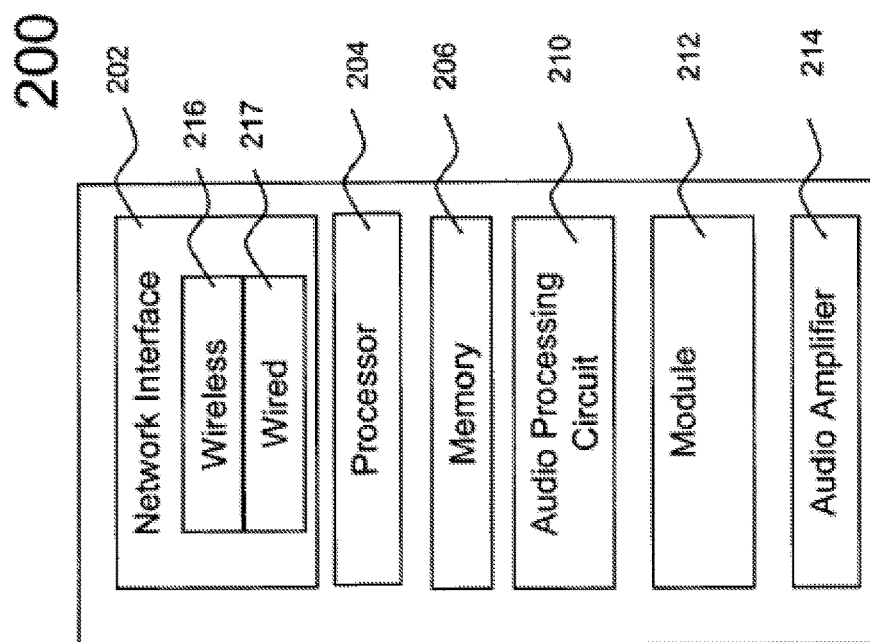


FIG. 2A

240

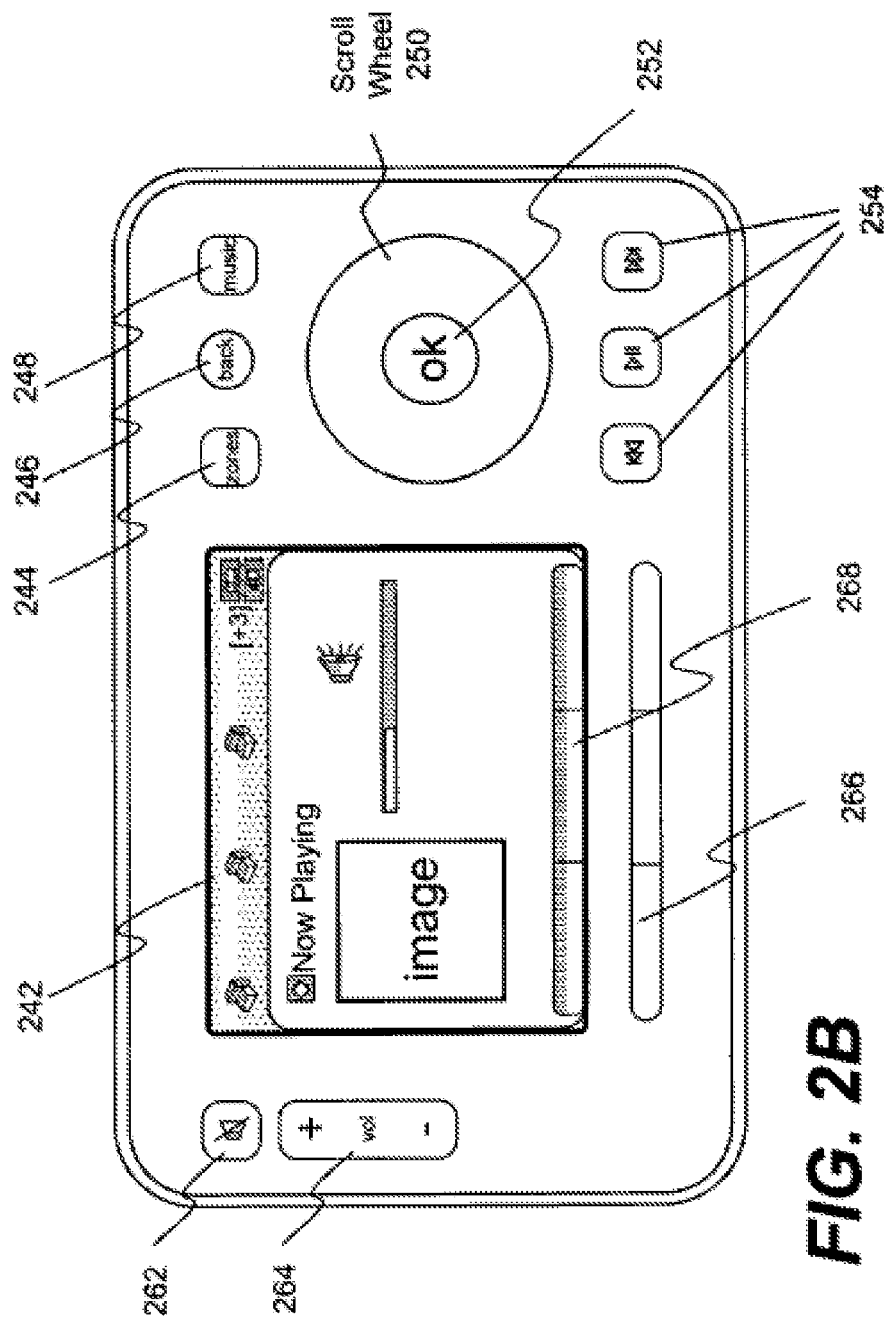


FIG. 2B

270

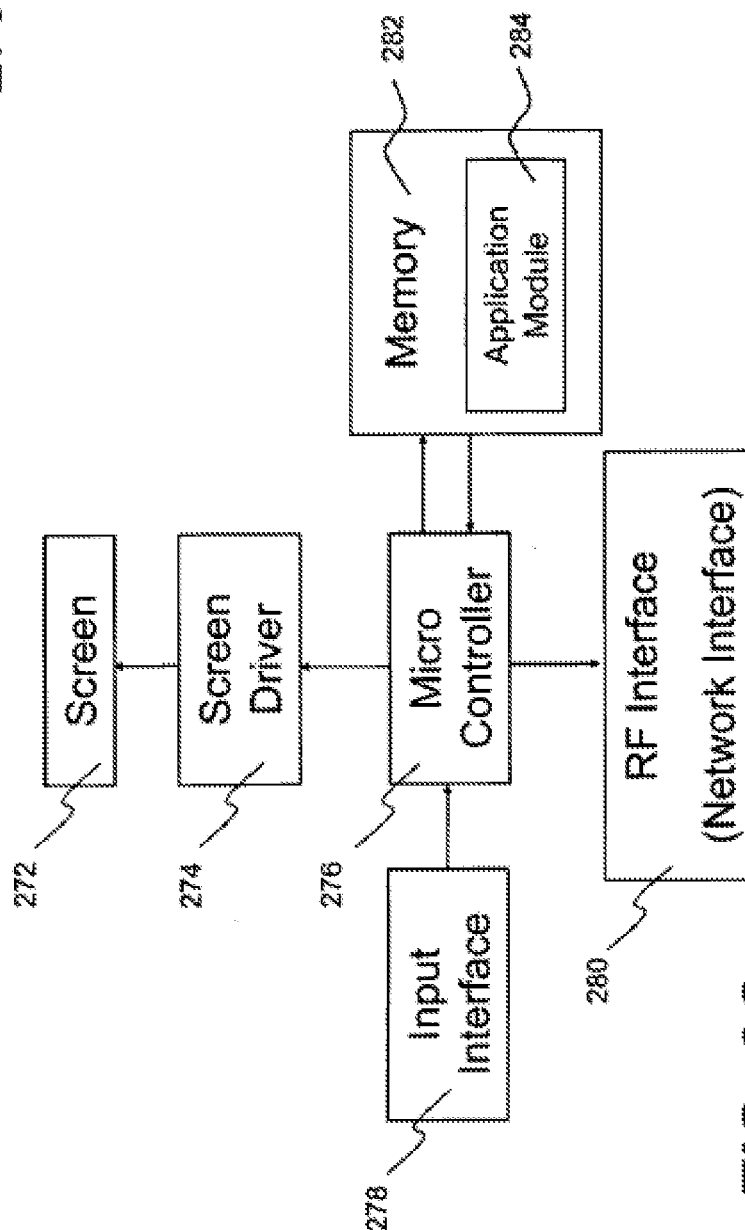


FIG. 2C

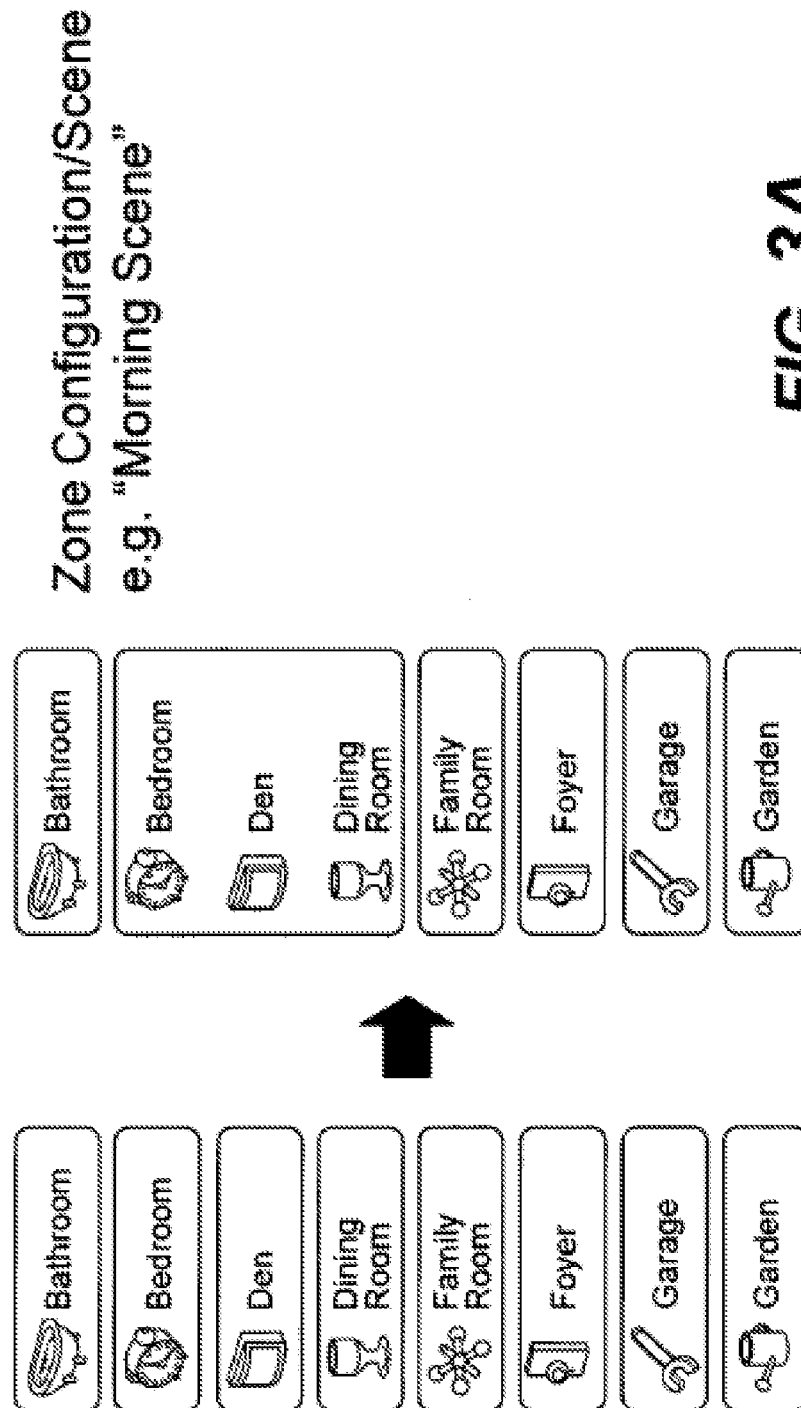


FIG. 3A

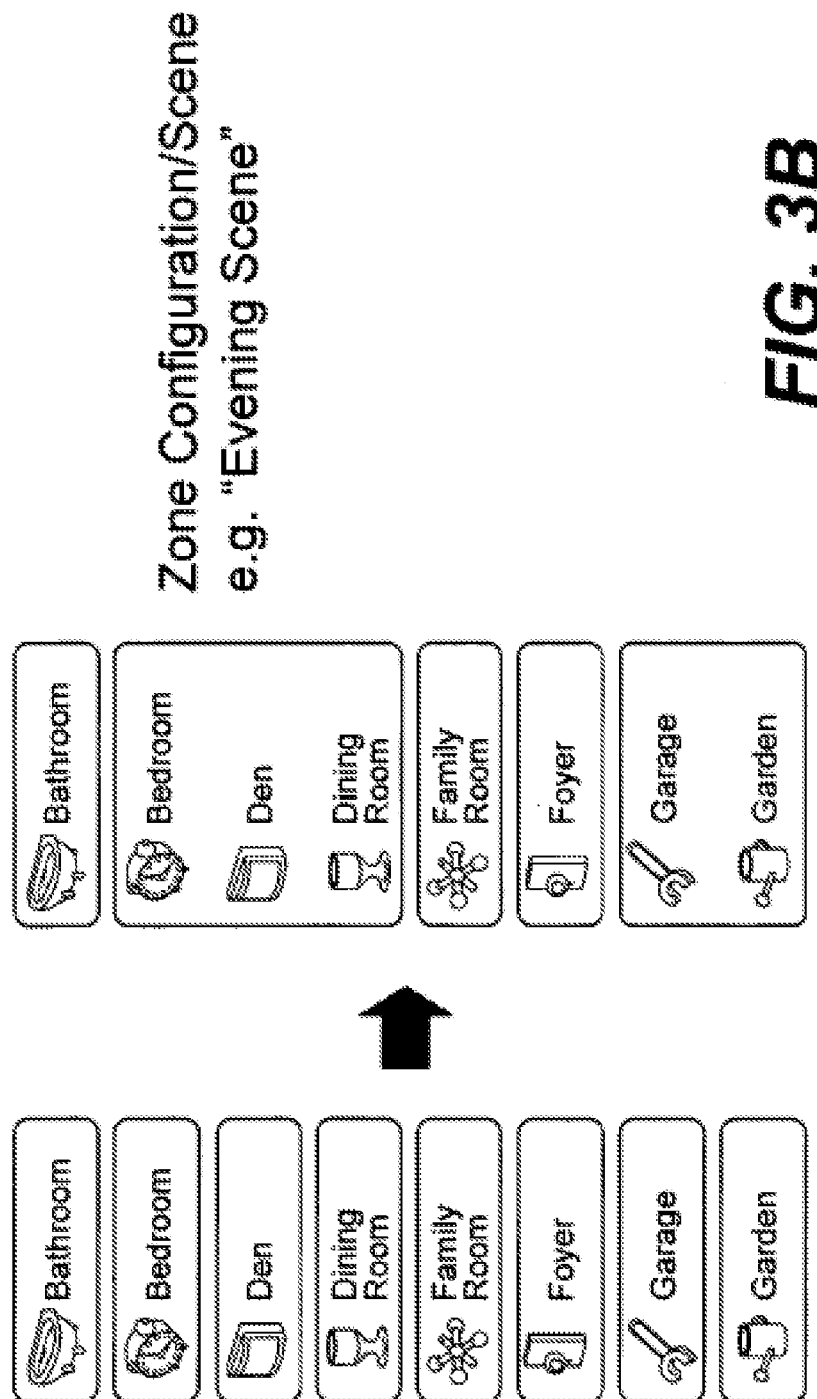
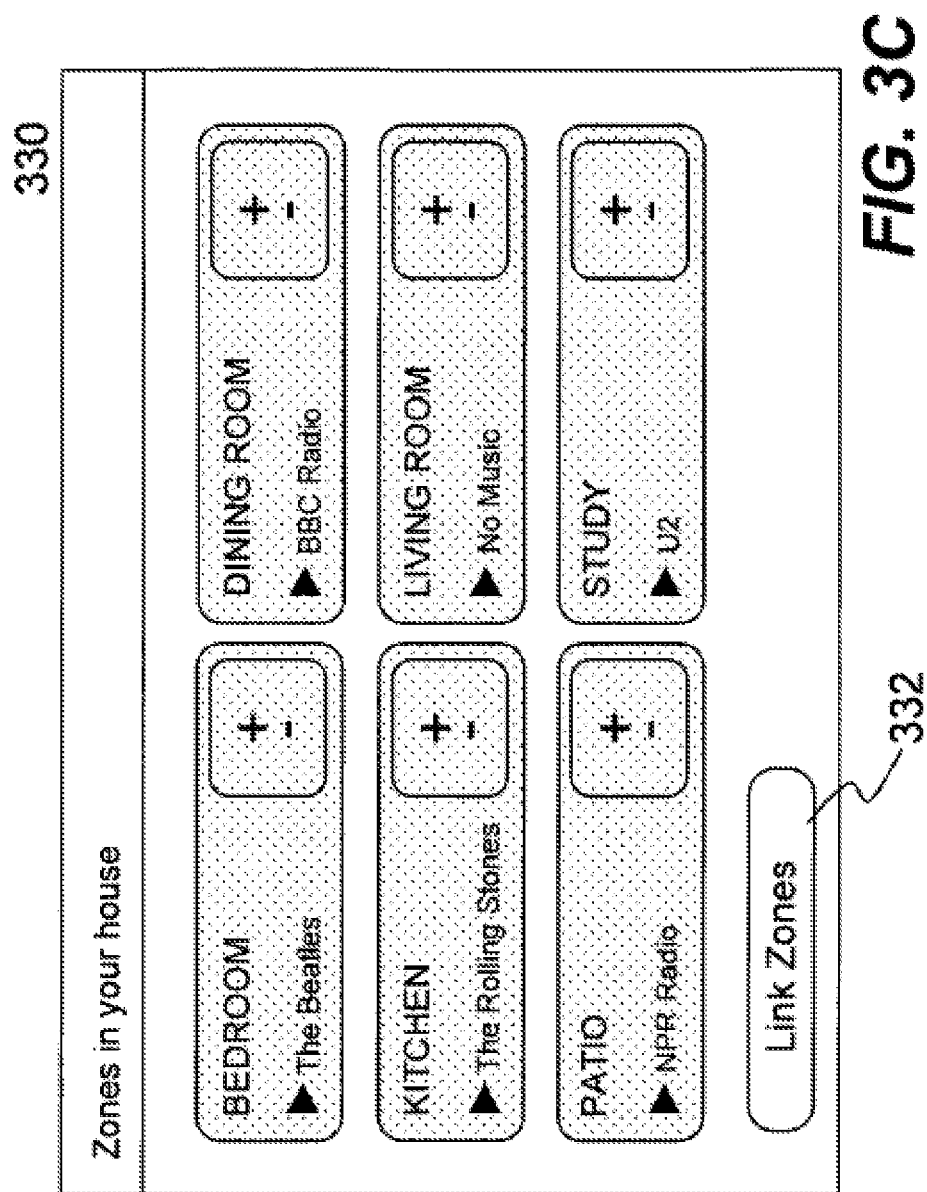


FIG. 3B



340

Zones in your house

BEDROOM ▶ The Beatles ☒	DINING ROOM ▶ BBC Radio ☒
KITCHEN ▶ The Rolling Stones ☐	LIVING ROOM ▶ No Music ☒
PATIO ▶ NPR Radio ☒	STUDY ▶ U2 ☐

Link Zones

Cancel

FIG. 3D

350

Zones in your house

BEDROOM + DINING ROOM + LIVING ROOM
+ PATIO

▶ The Beatles

+ -

KITCHEN

▶ The Rolling Stones

+ -

STUDY

▶ U2

+ -

Link Zones

FIG. 3E

Master Bedroom Kitchen Patio

New Alarm 400

Alarm (On)
Time (7.15am)
Zone (Master Bedroom + linked zones)
Music (Wakeup Playlist)
Frequency (Weekdays)
Alarm length (45mins)

Play Alarm Now | Save Alarm

How often should the alarm sound?

Once
Weekdays
Weekends
Every Day

FIG. 4

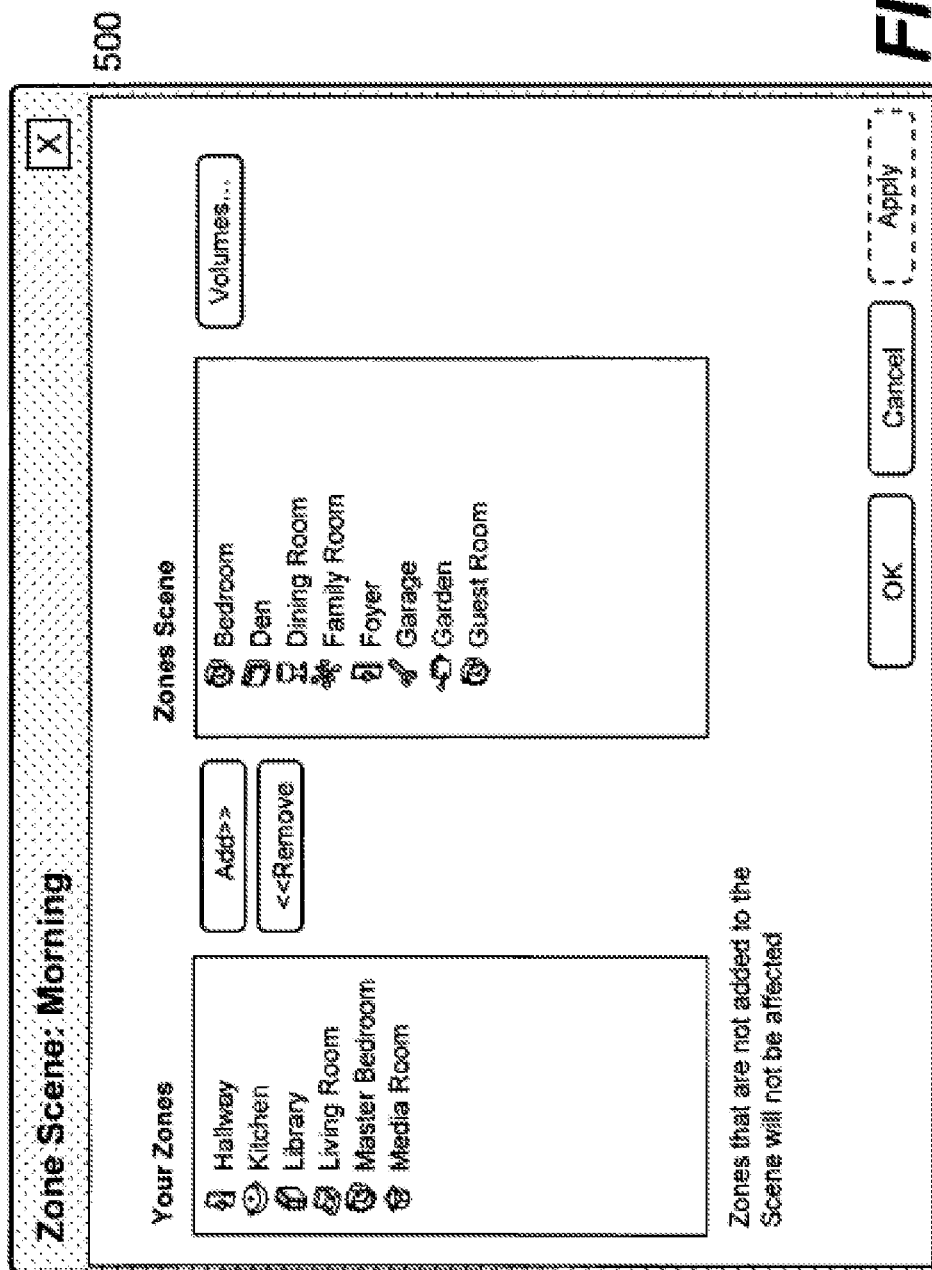


FIG. 5A

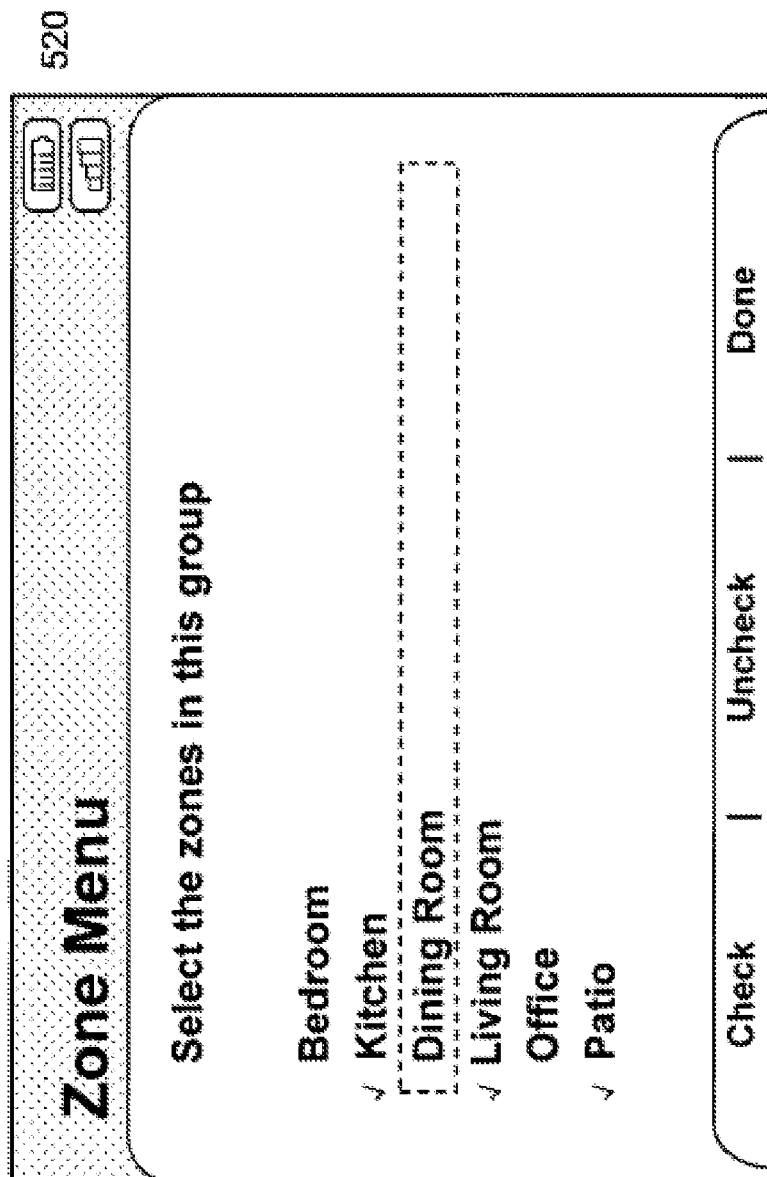


FIG. 5B

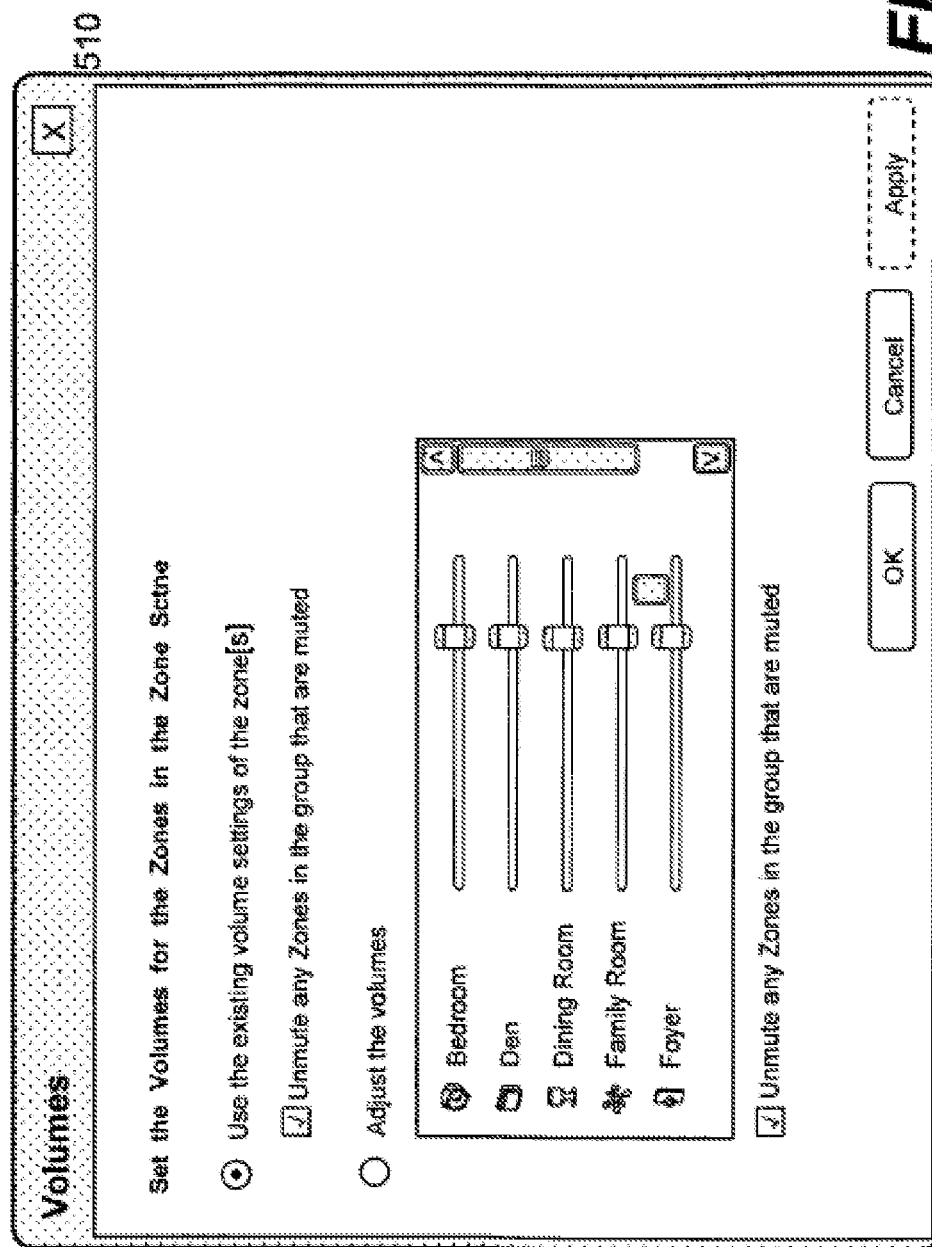
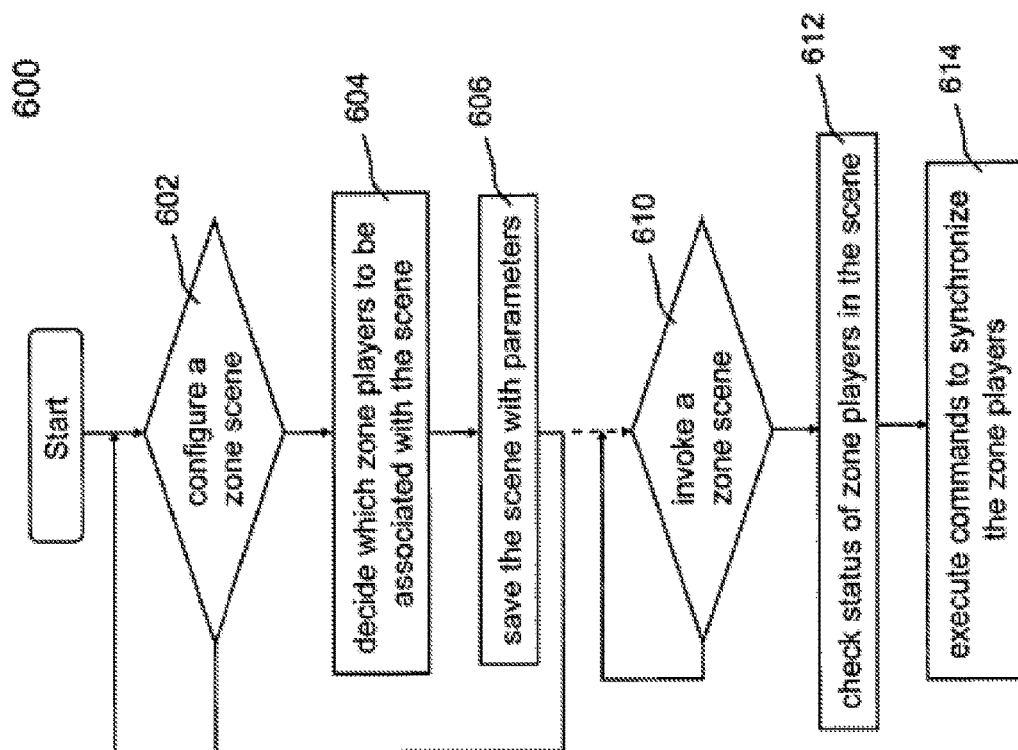


FIG. 5C

**FIG. 6**

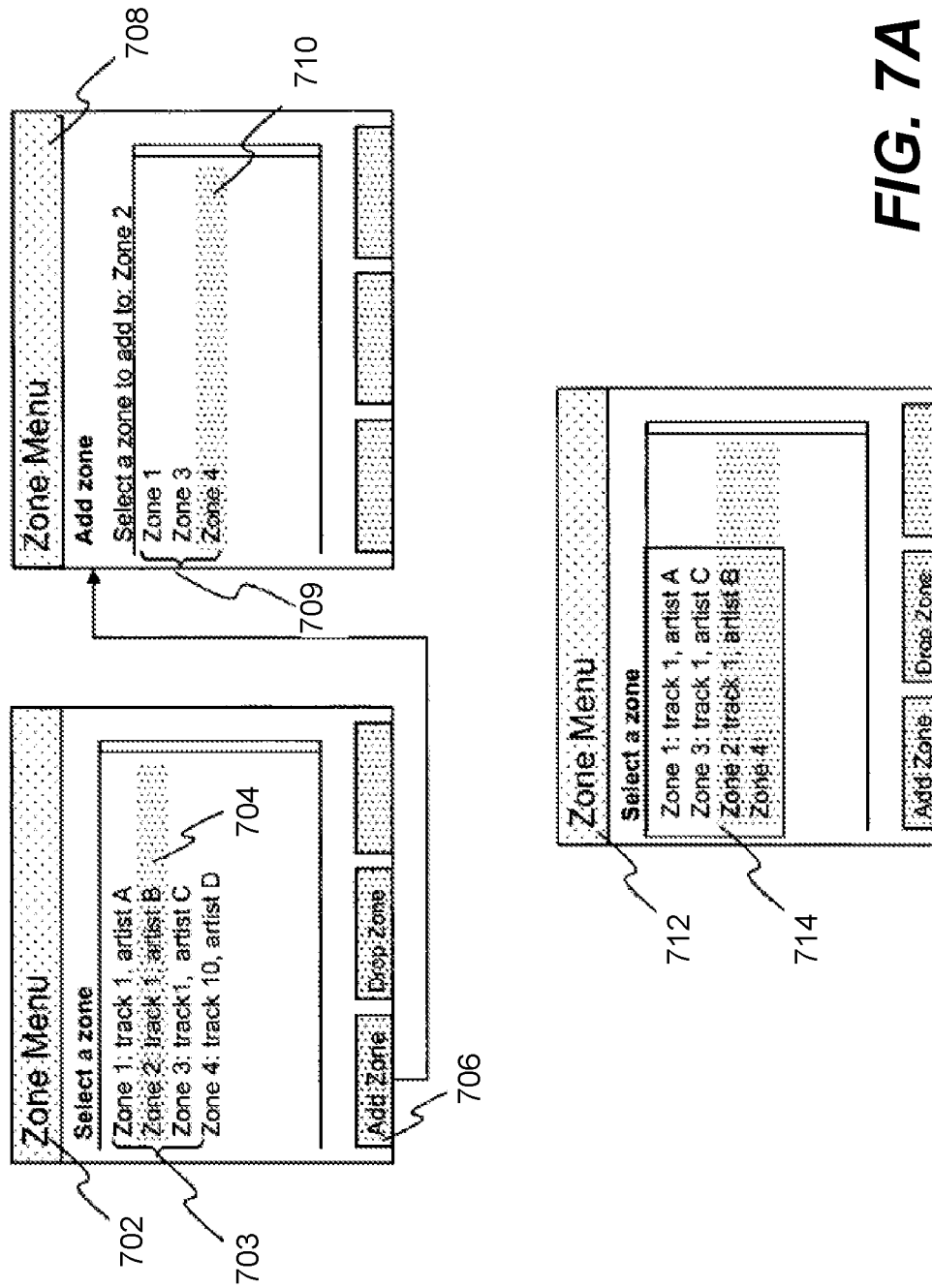
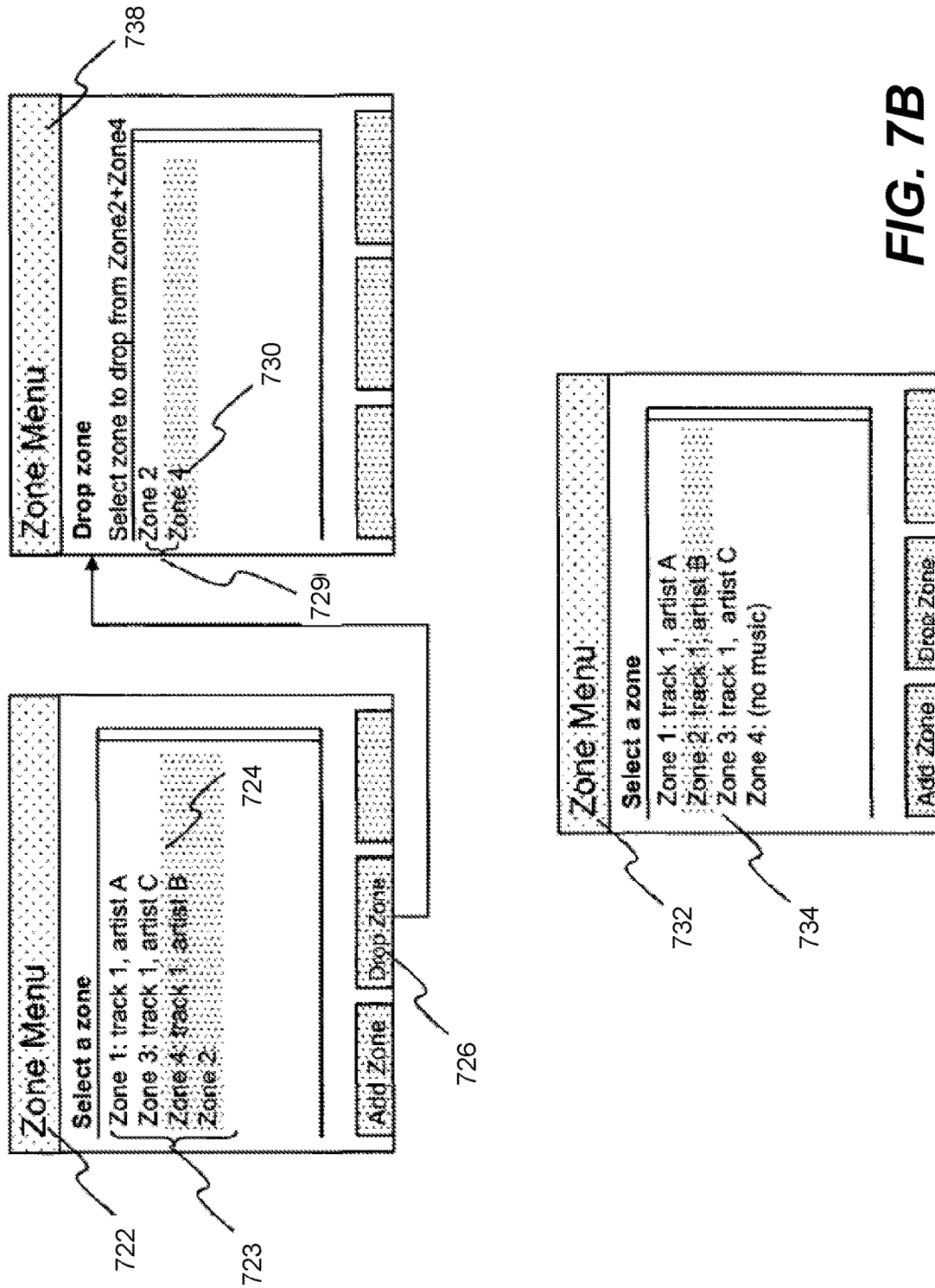


FIG. 7A



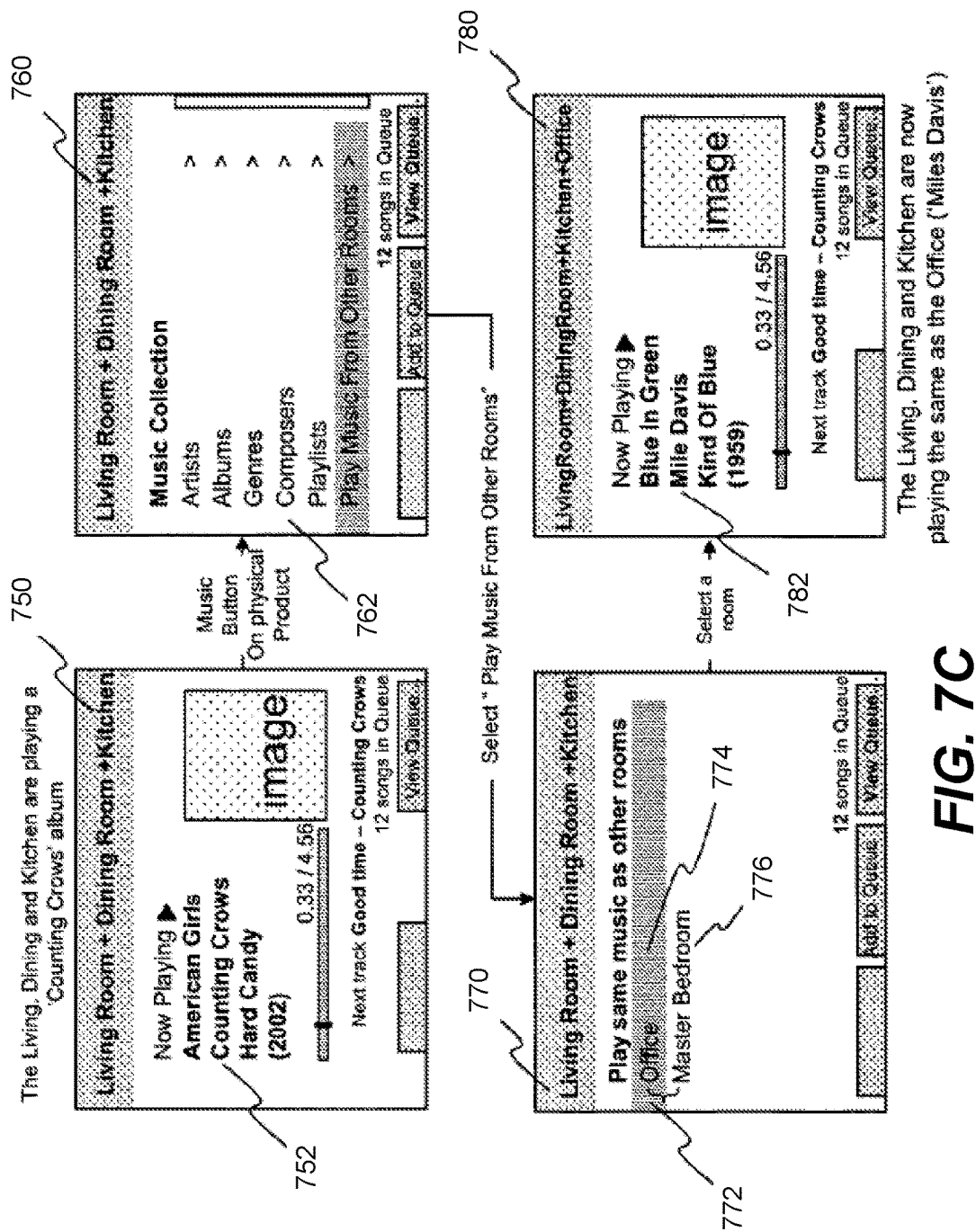


FIG. 7C

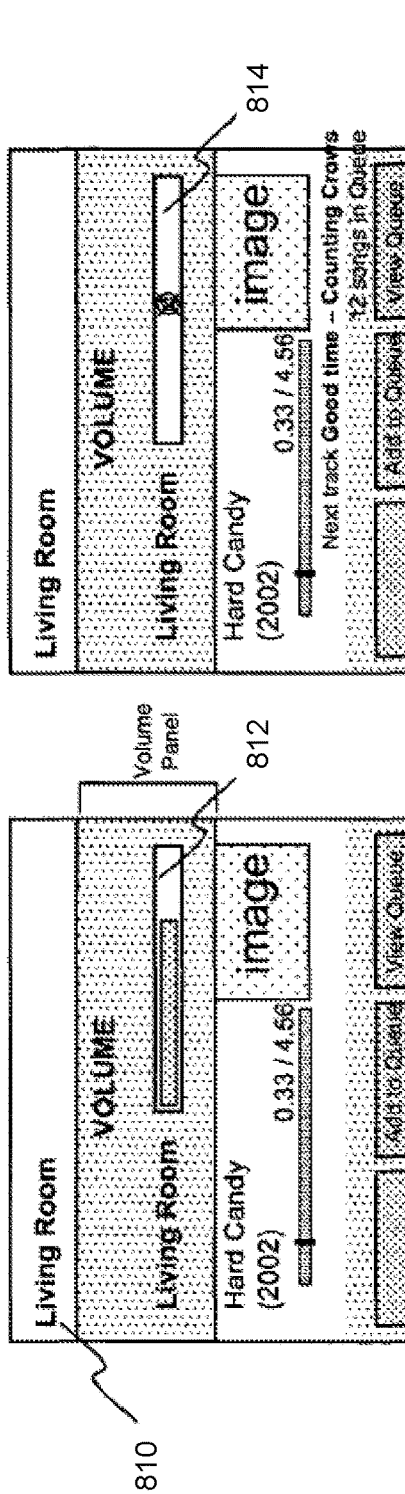


FIG. 8A

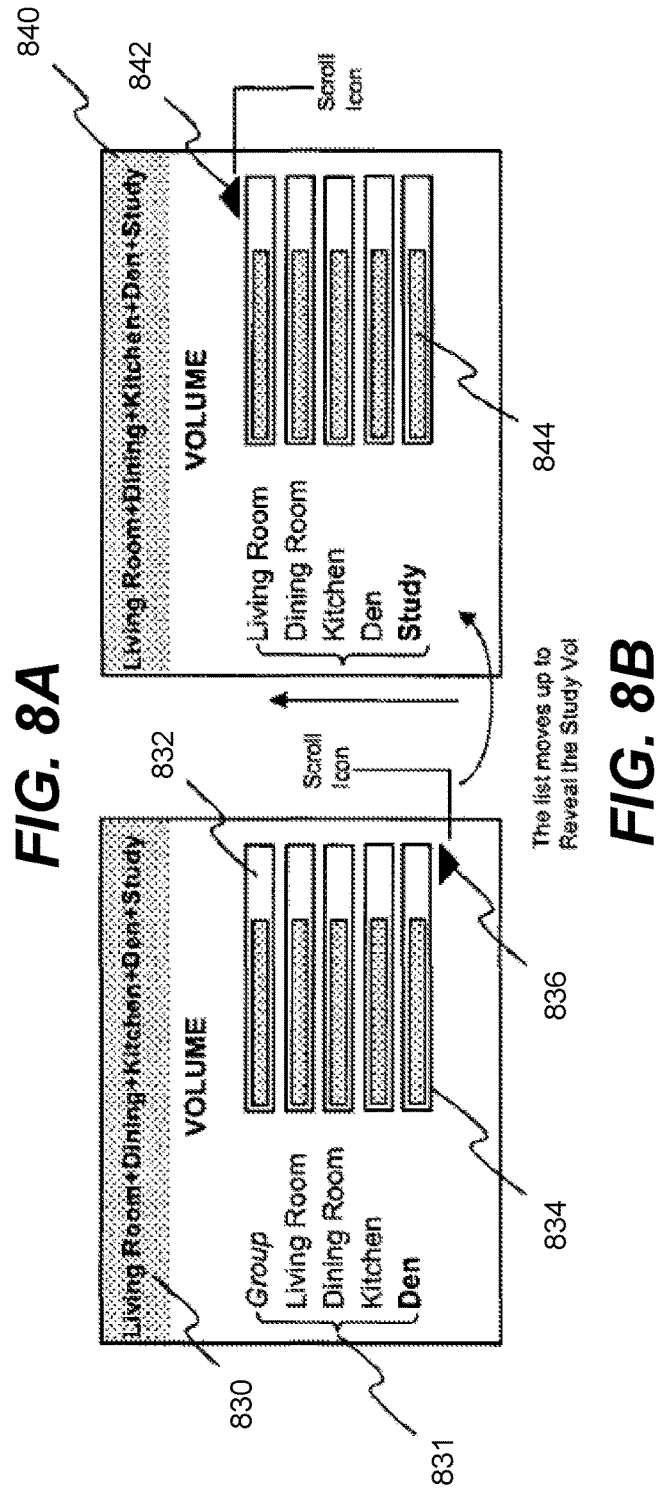
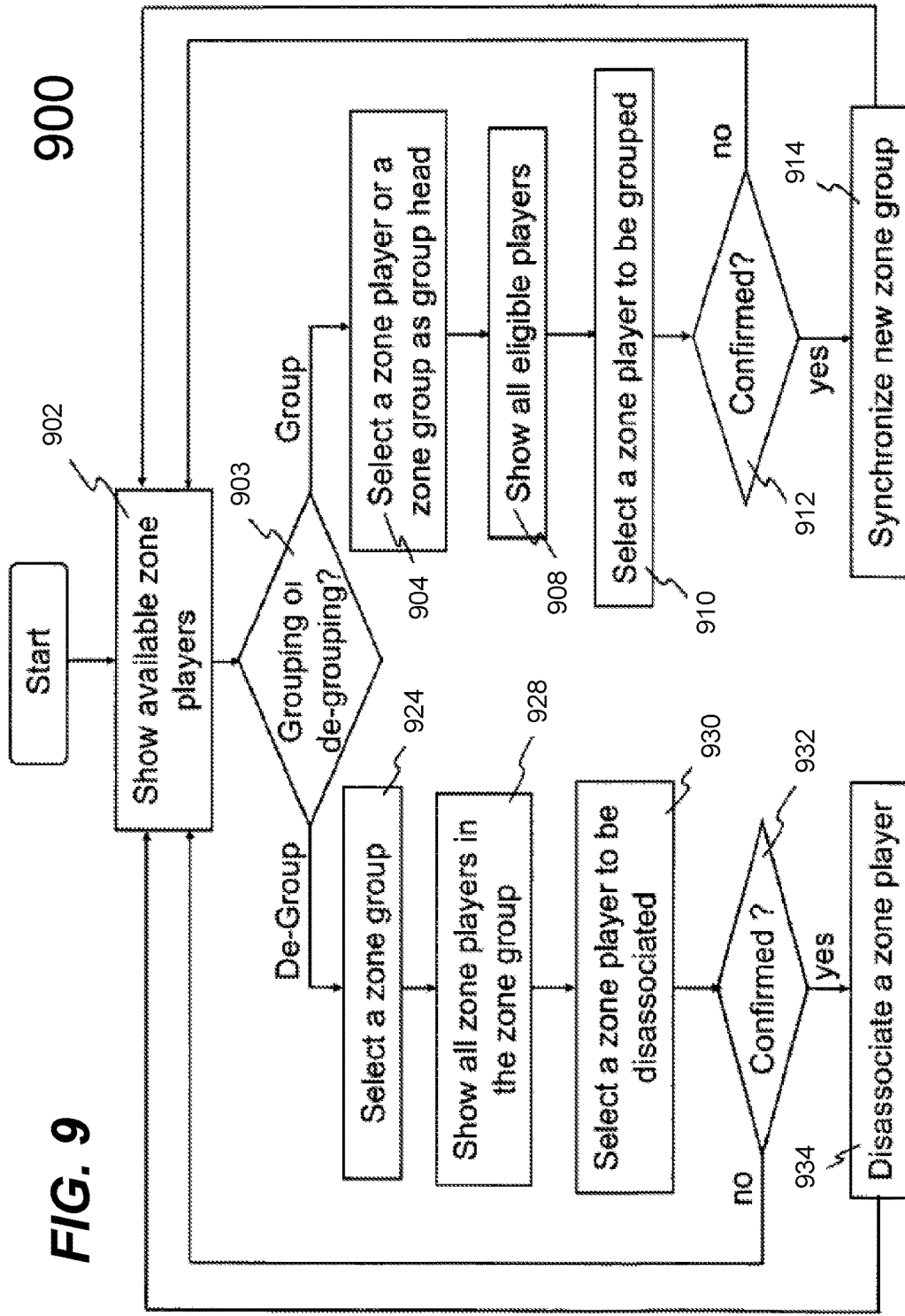
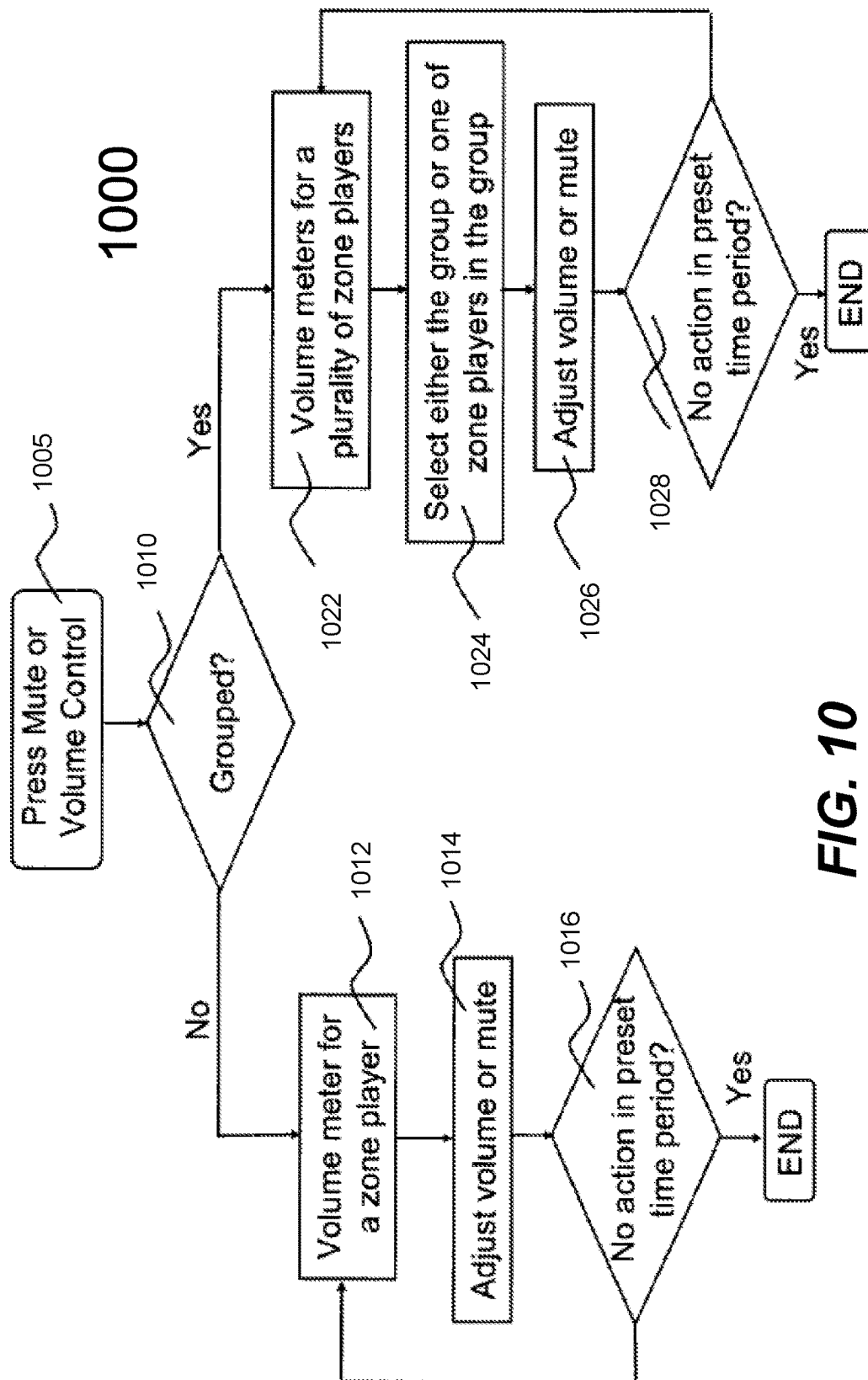


FIG. 8B





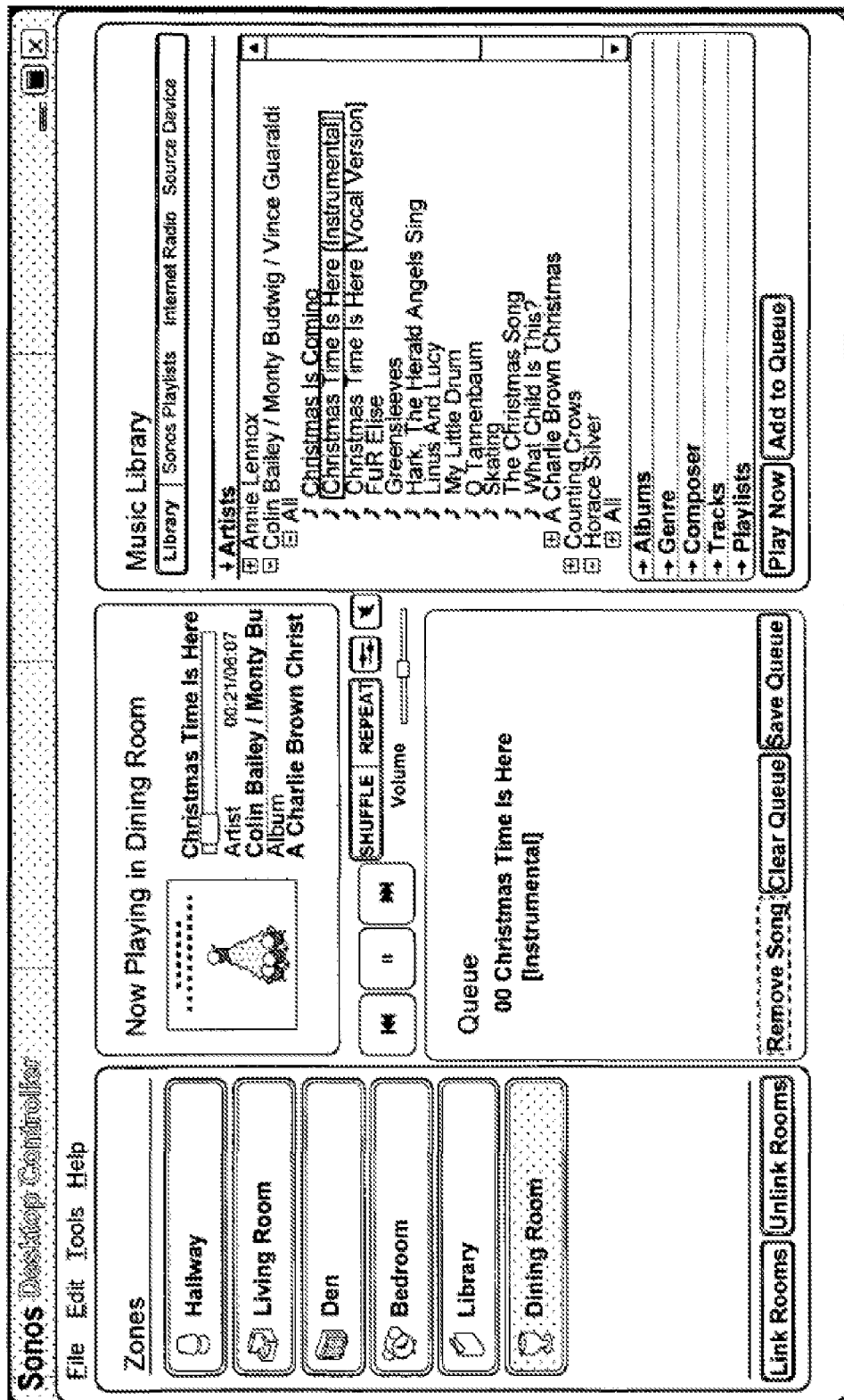


FIG. 11A

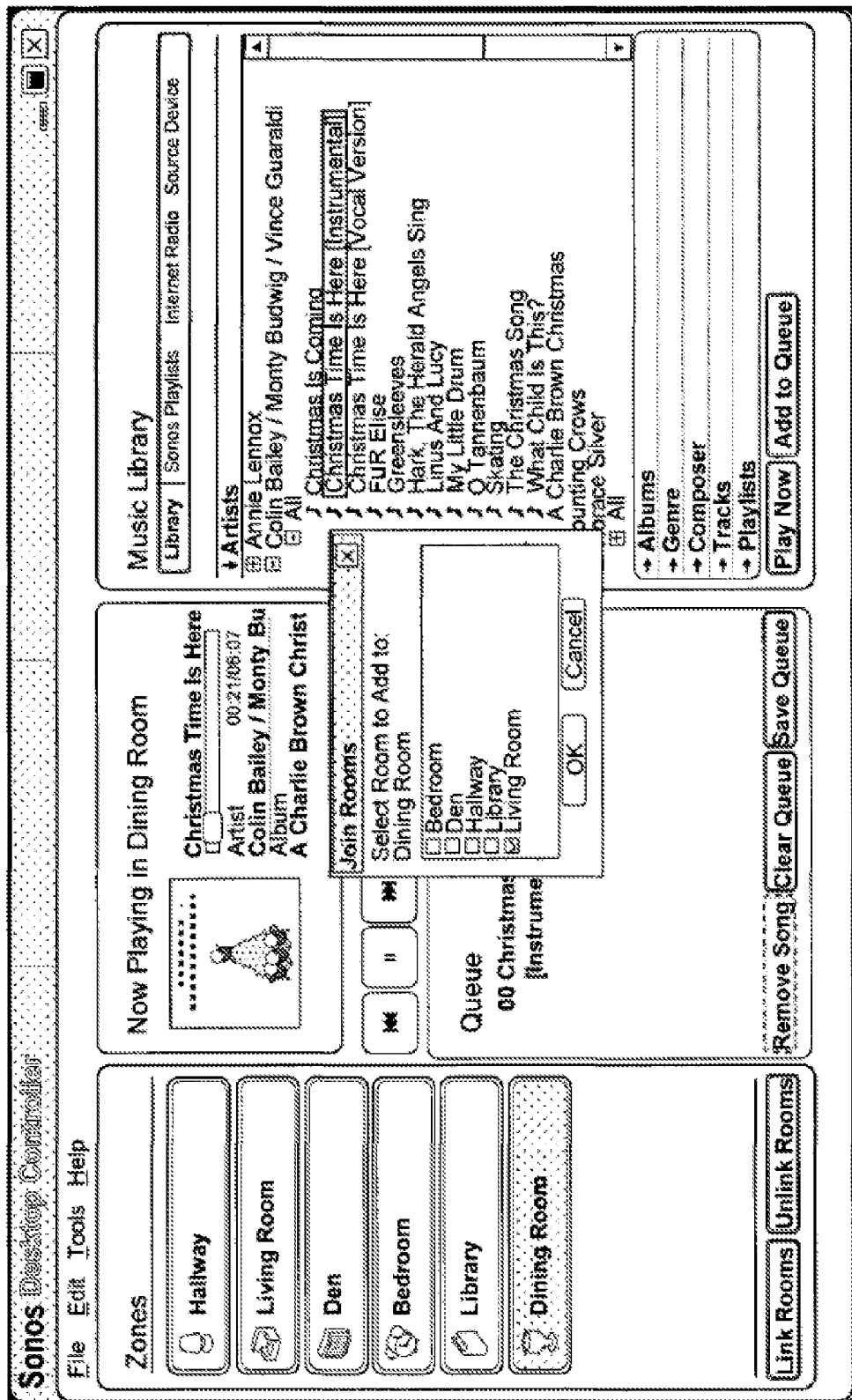


FIG. 11B

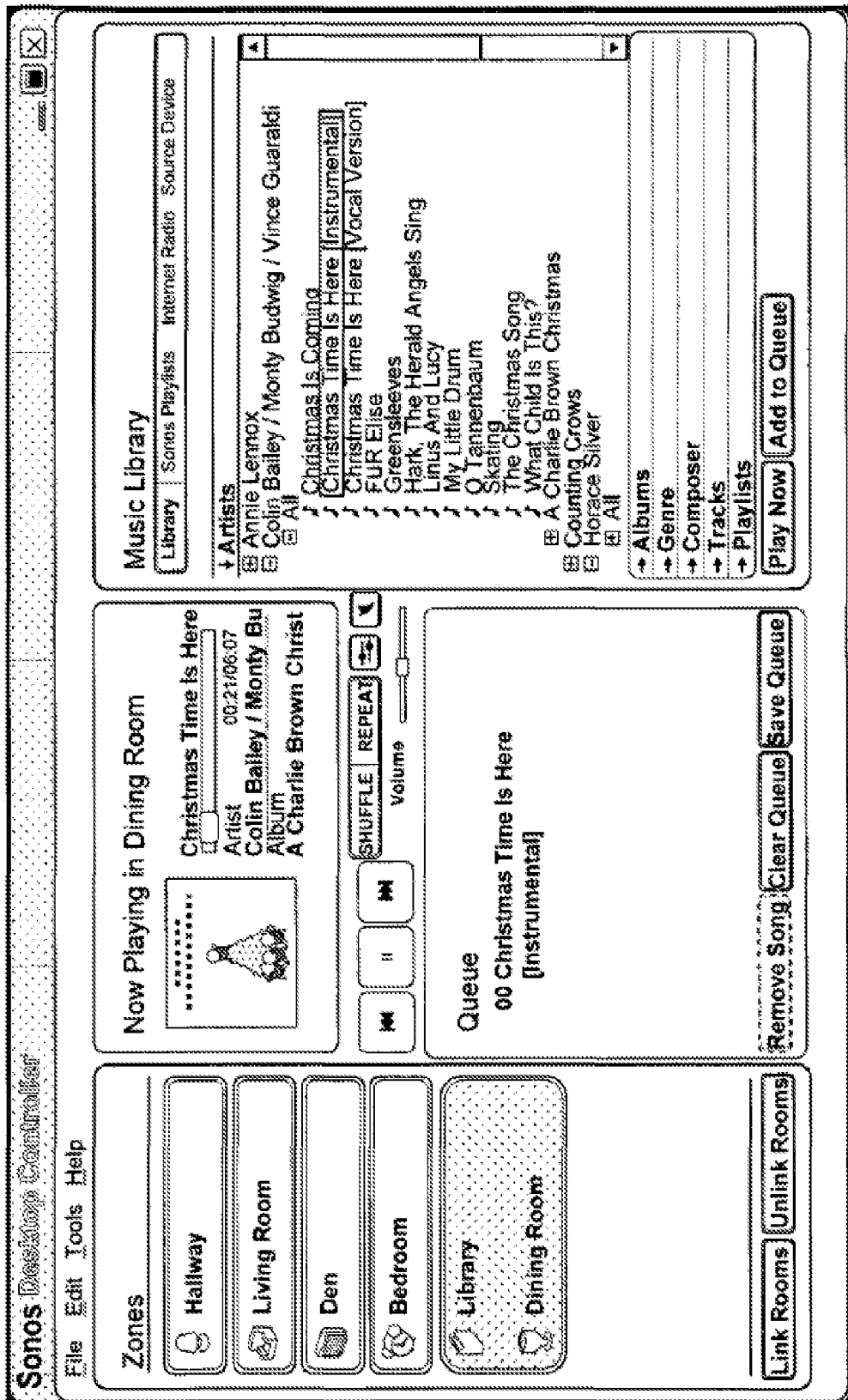


FIG. 11C

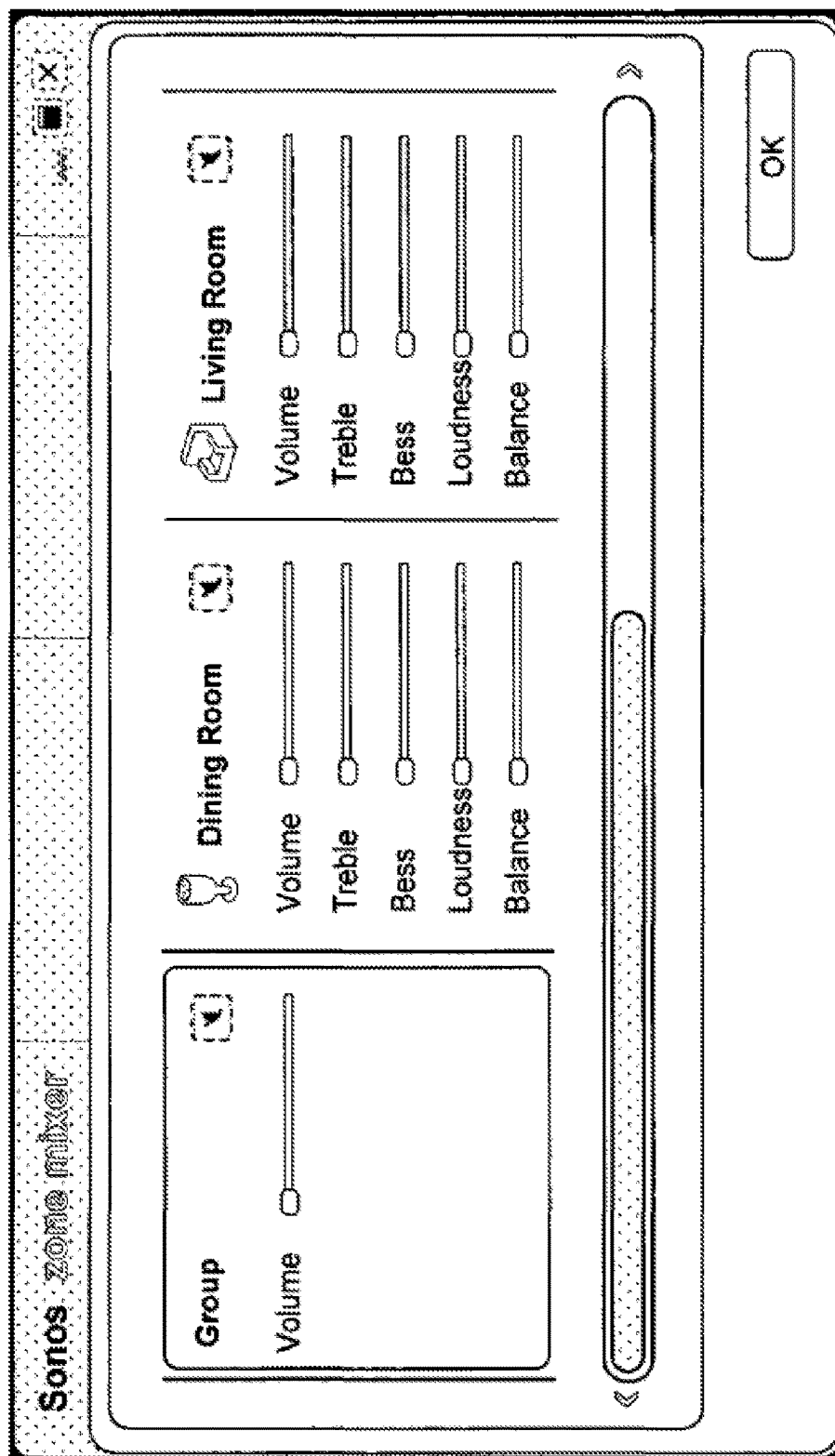


FIG. 11D

PLAYBACK DEVICE GROUPING**CROSS-REFERENCE TO RELATED APPLICATIONS**

The present application is a continuation of U.S. application Ser. No. 14/808,875 filed on Jul. 24, 2015, and currently pending; U.S. application Ser. No. 14/808,875 is a continuation of U.S. application Ser. No. 13/907,666 filed on May 31, 2013, and issued on Sep. 22, 2015, as U.S. Pat. No. 9,141,645; U.S. application Ser. No. 13/907,666 is a continuation of U.S. application Ser. No. 13/619,237 filed on Sep. 14, 2012, and issued on Nov. 19, 2013, as U.S. Pat. No. 8,588,949; U.S. application Ser. No. 13/619,237 is a continuation of U.S. application Ser. No. 12/035,112 filed on Feb. 21, 2008, and issued on Oct. 16, 2012, as U.S. Pat. No. 8,290,603; U.S. application Ser. No. 12/035,112 is a continuation-in-part of U.S. application Ser. No. 10/861,653 filed on Jun. 5, 2004, and issued on Aug. 4, 2009, as U.S. Pat. No. 7,571,014; U.S. application Ser. No. 10/861,653 is a continuation-in-part of U.S. application Ser. No. 10/816,217 filed on Apr. 1, 2004, and issued on Jul. 31, 2012, as U.S. Pat. No. 8,234,395; U.S. application Ser. No. 10/816,217 claims priority to U.S. Prov. App. 60/490,768 filed on Jul. 28, 2003. The entire contents of the U.S. application Ser. Nos. 14/808,875; 13/907,666; 13/619,237; 12/035,112; 10/861,653; 10/816,217; and 60/490,768 applications are incorporated herein by reference.

BACKGROUND OF THE INVENTION**Field of the Invention**

The invention is generally related to the area of consumer electronics and human-computer interaction. In particular, the invention is related to user interfaces for controlling or manipulating a plurality of multimedia players in a multi-zone system.

An enduring passion for quality audio reproduction or system is continuing to drive demands from users. One of the demands includes an audio system in a house in which, for example, one could grill to classic rock on a patio while another one may cook up his/her own music selections in a kitchen. This is all at the same time while a teenager catches a ballgame in a family room, and another one blasts pop in a bedroom. And the best part of such audio system is that each family member does not need his or her own stereo system—one system gives everyone access to all the music sources.

Currently, one of the systems that can meet part of such demand is a conventional multi-zone audio system that usually includes a number of audio players. Each of the audio players has its own amplifier(s) and a set of speakers and typically installed in one place (e.g., a room). In order to play an audio source at one location, the audio source must be provided locally or from a centralized location. When the audio source is provided locally, the multi-zone audio system functions as a collection of many stereo systems, making source sharing difficult. When the audio source is provided centrally, the centralized location may include a juke box, many compact discs, an AM or FM radio, tapes, or others. To send an audio source to an audio player demanding such source, a cross-bar type of device is used to prevent the audio source from going to other audio players that may be playing other audio sources.

In order to achieve playing different audio sources in different audio players, the traditional multi-zone audio

system is generally either hard-wired or controlled by a pre-configured and pre-programmed controller. While the pre-programmed configuration may be satisfactory in one situation, it may not be suitable for another situation. For example, a person would like to listen to broadcast news from his/her favorite radio station in a bedroom, a bathroom and a den while preparing to go to work in the morning. The same person may wish to listen in the den and the living room to music from a compact disc in the evening. In order to satisfy such requirements, two groups of audio players must be established. In the morning, the audio players in the bedroom, the bathroom and the den need to be grouped for the broadcast news. In the evening, the audio players in the den and the living room are grouped for the music. Over the weekend, the audio players in the den, the living room, and a kitchen are grouped for party music. Because the morning group, the evening group and the weekend group contain the den, it can be difficult for the traditional system to accommodate the requirement of dynamically managing the ad hoc creation and deletion of groups.

There is a need for dynamic control of the audio players as a group. With a minimum manipulation, the audio players may be readily grouped. There is further a need for user interfaces that may be readily utilized to group and control the audio players.

SUMMARY OF THE INVENTION

This section is for the purpose of summarizing some aspects of the present invention and to briefly introduce some preferred embodiments. Simplifications or omissions in this section as well as in the abstract or the title of this description may be made to avoid obscuring the purpose of this section, the abstract and the title. Such simplifications or omissions are not intended to limit the scope of the present invention.

In general, the present invention pertains to controlling a plurality of multimedia players, or simply players, in groups. According to one aspect of the present invention, a mechanism is provided to allow a user to group some of the players according to a theme or scene, where each of the players is located in a zone. When the scene is activated, the players in the scene react in a synchronized manner. For example, the players in the scene are all caused to play an audio source or music in a playlist, wherein the audio source may be located anywhere on a network.

According to another aspect of the present invention, various user interfaces are provided to facilitate a user to create and manage a group and also create, edit or update a playlist for the group. Depending on implementation, the user interfaces may be displayed on a touch screen from which a user may act directly with the screen to group the players, the user interfaces may also be displayed on a display with other means (e.g., a stylus, a scroll wheel, or arrow buttons) to interact. In addition, the user displays are configured to show graphically how many players in a group versus other individual players.

According to still another aspect of the present invention, the scene may be activated at any time or a specific time. A user may activate the scene at any time so that only some selected zones in an entertainment system facilitate a playback of an audio source. When the scene is activated at a specific time, the scene may be used as an alarm or buzzer.

According to still another aspect of the present invention, a controlling device (also referred to herein as controller) is provided to facilitate a user to select any of the players in the system to form respective groups each of which is set up per

a scene. Although various scenes may be saved in any of the members in a group, commands are preferably sent from the controller to the rest of the members when one of the scenes is executed. Depending on implementation, the commands include parameters pertaining to identifiers of the players, volumes settings, audio source and etc.

According to yet another aspect of the present invention, a configurable module is implemented in the controlling device that provides interactive graphic user interface for forming, managing and controlling groups in the system, de-grouping a group or adjusting audio volume of individual players or a group of players.

The present invention may be implemented in many forms including software, hardware or a combination of both. According to one embodiment, the present invention is directed to a method for groupings in a multi-zone media system, the method comprises providing a mechanism to allow a user to determine which players in the system to be associated with a theme representing a group; and configuring the theme with parameters pertaining to the players, wherein the theme is activated at anytime or a specific time so that the players react in a synchronized manner. The players in a scene are synchronized to play a multimedia file when the scene is activated.

According to another embodiment, the present invention is directed to a method for groupings in a multi-zone media system, the method comprises providing a user interface to allow a user to determine which players in the system to be associated with a theme representing a group, the user interface showing all available players at the time the user interface is created; allowing the user to visually select one of the players to be a first member of the theme; allowing the user to add more of the available players to the theme, if desired; and configuring the theme with parameters pertaining to the players. The theme may be activated at anytime or a specific time so that the players react in a synchronized manner.

According to still another embodiment, the present invention is directed to an entertainment system for grouping players, the system comprises: a plurality of players, each located in one zone; and a controller providing a mechanism to allow a user to select which of the players to be associated with a theme representing a group; and configure the theme with parameters pertaining to the selected players, wherein the theme is activated at anytime or a specific time so that the selected players react in a synchronized manner. As a result, the selected players are synchronized to play a multimedia that is in a digital format and retrieved from a source over a network.

One of the objects, features, and advantages of the present invention is to remotely control a plurality of multimedia players in a multi-zone system, playing and controlling the audio source synchronously if the players are grouped together, or playing and controlling the audio source individually if the players are disassociated with each other.

Other objects, features, and advantages of the present invention will become apparent upon examining the following detailed description of an embodiment thereof, taken in conjunction with the attached drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features, aspects, and advantages of the present invention will become better understood with regard to the following description, appended claims, and accompanying drawings where:

FIG. 1 shows an exemplary configuration in which the present invention may be practiced;

FIG. 2A shows an exemplary functional block diagram of a player in accordance with the present invention;

FIG. 2B shows an example of a controller that may be used to remotely control one of more players of FIG. 2A;

FIG. 20 shows an exemplary internal functional block diagram of a controller in accordance with one embodiment of the present invention;

FIG. 3A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after “Morning”;

FIG. 3B shows that a user defines multiple groups to be gathered at the same time;

FIG. 3C shows an exemplary user interface (UI) of individual zones in a house;

FIG. 3D shows a user interface as a result of the use activating “link zones” of FIG. 3C,

FIG. 3E shows a user interface after the user has selected some of the available zone players into the scene;

FIG. 4 shows an exemplary user interface that may be displayed on a controller or a computer of FIG. 1;

FIG. 5A shows another user interface to allow a user to form a scene;

FIG. 5B shows still another user interface to allow a user to form a scene;

FIG. 5C shows a user interface to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively; and

FIG. 6 shows a flowchart or process of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone.

FIGS. 7A and 7B illustrate a sequence of screen displays in accordance with one embodiment of the present invention for controlling a plurality of players;

FIG. 7C shows a sequence of screen displays in accordance with one embodiment of the present invention for alternatively controlling players;

FIGS. 8A and 8B show a sequence of screen displays in accordance with one embodiment of the present invention for controlling players regarding audio volume;

FIG. 9 shows a flowchart or process of controlling a plurality of zones players according to one embodiment of the present invention;

FIG. 10 shows a flowchart or process of controlling audio volume of a plurality of players in a zone group according to one embodiment of the present invention; and

FIGS. 11A-11D show a sequence of screen displays in accordance with one embodiment of the present invention on a computing device for alternatively controlling players.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The detailed description of the invention is presented largely in terms of procedures, steps, logic blocks, processing, and other symbolic representations that directly or indirectly resemble the operations of data processing devices coupled to networks. These process descriptions and representations are typically used by those skilled in the art to most effectively convey the substance of their work to others skilled in the art. Numerous specific details are set forth in order to provide a thorough understanding of the present invention. However, it will become obvious to those skilled in the art that the present invention may be practiced without

these specific details. In other instances, well known methods, procedures, components, and circuitry have not been described in detail to avoid unnecessarily obscuring aspects of the present invention.

Reference herein to “one embodiment” or “an embodiment” means that a particular feature, structure, or characteristic described in connection with the embodiment can be included in at least one embodiment of the invention. The appearances of the phrase “in one embodiment” in various places in the specification are not necessarily all referring to the same embodiment, nor are separate or alternative embodiments mutually exclusive of other embodiments. Further, the order of blocks in process flowcharts or diagrams representing one or more embodiments of the invention do not inherently indicate any particular order nor imply any limitations in the invention.

Referring now to the drawings, in which like numerals refer to like parts throughout the several views, FIG. 1 shows an exemplary configuration 100 in which the present invention may be practiced. The configuration may represent, but not be limited to, a part of a residential home, a business building or a complex with multiple zones. There are a number of multimedia players of which three examples 102, 104 and 106 are shown as audio devices. Each of the audio devices may be installed or provided in one particular area or zone and hence referred to as a zone player herein.

As used herein, unless explicitly stated otherwise, an audio source or audio sources are in digital format and can be transported or streamed over a data network. To facilitate the understanding of the present invention, it is assumed that the configuration 100 represents a home. Thus, the zone player 102 and 104 may be located in two of the bedrooms respectively while the zone player 106 may be installed in a living room. All of the zone players 102, 104 and 106 are coupled directly or indirectly to a data network 108. In addition, a computing device 110 is shown to be coupled on the network 108. In reality, any other devices such as a home gateway device, a storage device, or an MP3 player may be coupled to the network 108 as well.

The network 108 may be a wired network, a wireless network or a combination of both. In one example, all devices including the zone players 102, 104 and 106 are coupled to the network 108 by wireless means based on an industry standard such as IEEE 802.11. In yet another example, all devices including the zone players 102, 104 and 106 are part of a local area network that communicates with a wide area network (e.g., the Internet).

Many devices on the network 108 are configured to download and store audio sources. For example, the computing device 110 can download audio sources from the Internet and store the downloaded sources locally for sharing with other devices on the Internet or the network 108. The computing device 110 or any of the zone players can also be configured to receive streaming audio. Shown as a stereo system, the device 112 is configured to receive an analog audio source (e.g., from broadcasting) or retrieve a digital audio source (e.g., from a compact disk). The analog audio sources can be converted to digital audio sources. In accordance with the present invention, the audio source may be shared among the devices on the network 108.

Two or more zone players may be grouped together to form a new zone group. Any combinations of zone players and an existing zone group may be grouped together. In one instance, a new zone group is formed by adding one zone player to another zone player or an existing zone group.

Referring now to FIG. 2A, there is shown an exemplary functional block diagram of a zone player 200 in accordance

with the present invention. The zone player 200 includes a network interface 202, a processor 204, a memory 206, an audio processing circuit 210, a module 212, and optionally, an audio amplifier 214 that may be internal or external. The network interface 202 facilitates a data flow between a data network (i.e., the data network 108 of FIG. 1) and the zone player 200 and typically executes a special set of rules (i.e., a protocol) to send data back and forth. One of the common protocols used in the Internet is TCP/IP (Transmission Control Protocol/Internet Protocol). In general, a network interface manages the assembling of an audio source or file into smaller packets that are transmitted over the data network or reassembles received packets into the original source or file. In addition, the network interface 202 handles the address part of each packet so that it gets to the right destination or intercepts packets destined for the zone player 200.

The network interface 202 may include one or both of a wireless interface 216 and a wired interface 217. The wireless interface 216, also referred to as a RF interface, provides network interface functions by a wireless means for the zone player 200 to communicate with other devices in accordance with a communication protocol (such as the wireless standard IEEE 802.11a, 802.11b or 802.11g). The wired interface 217 provides network interface functions by a wired means (e.g., an Ethernet cable). In one embodiment, a zone player includes both of the interfaces 216 and 217, and other zone players include only a RF or wired interface. Thus these other zone players communicate with other devices on a network or retrieve audio sources via the zone player. The processor 204 is configured to control the operation of other parts in the zone player 200. The memory 206 may be loaded with one or more software modules that can be executed by the processor 204 to achieve desired tasks. According to one aspect of the present invention, a software module implementing one embodiment of the present invention is executed, the processor 204 operates in accordance with the software module in reference to a saved zone group configuration characterizing a zone group created by a user, the zone player 200 is caused to retrieve an audio source from another zone player or a device on the network.

According to one embodiment of the present invention, the memory 206 is used to save one or more saved zone configuration files that may be retrieved for modification at any time. Typically, a saved zone group configuration file is transmitted to a controller (e.g., the controlling device 140 or 142 of FIG. 1, a computer, a portable device, or a TV) when a user operates the controlling device. The zone group configuration provides an interactive user interface so that various manipulations or control of the zone players may be performed.

The audio processing circuit 210 resembles most of the circuitry in an audio playback device and includes one or more digital-to-analog converters (DAC), an audio preprocessing part, an audio enhancement part or a digital signal processor and others. In operation, when an audio source is retrieved via the network interface 202, the audio source is processed in the audio processing circuit 210 to produce analog audio signals. The processed analog audio signals are then provided to the audio amplifier 214 for playback on speakers. In addition, the audio processing circuit 210 may include necessary circuitry to process analog signals as inputs to produce digital signals for sharing with other devices on a network.

Depending on an exact implementation, the module 212 may be implemented as a combination of hardware and

software. In one embodiment, the module **212** is used to save a scene. The audio amplifier **214** is typically an analog circuit that powers the provided analog audio signals to drive one or more speakers.

Referring now to FIG. 2B, there is shown an exemplary controller **240**, which may correspond to the controlling device **140** or **142** of FIG. 1. The controller **240** may be used to facilitate the control of multi-media applications, automation and others in a complex. In particular, the controller **240** is configured to facilitate a selection of a plurality of audio sources available on the network, controlling operations of one or more zone players (e.g., the zone player **200**) through a RF interface corresponding to the RF interface **216** of FIG. 2A. According to one embodiment, the wireless means is based on an industry standard (e.g., infrared, radio, wireless standard IEEE 802.11a, 802.11b or 802.11g). When a particular audio source is being played in the zone player **200**, a picture, if there is any, associated with the audio source may be transmitted from the zone player **200** to the controller **240** for display. In one embodiment, the controller **240** is used to synchronize more than one zone players by grouping the zone players. In another embodiment, the controller **240** is used to control the volume of each of the zone players in a zone group individually or together.

The user interface for the controller **240** includes a screen **242** (e.g., a LCD screen) and a set of functional buttons as follows: a “zones” button **244**, a “back” button **246**, a “music” button **248**, a scroll wheel **250**, “ok” button **252**, a set of transport control buttons **254**, a mute button **262**, a volume up/down button **264**, a set of soft buttons **266** corresponding to the labels **268** displayed on the screen **242**.

The screen **242** displays various screen menus in response to a user’s selection. In one embodiment, the “zones” button **244** activates a zone management screen or “Zone Menu”, which is described in more details below. The “back” button **246** may lead to different actions depending on the current screen. In one embodiment, the “back” button triggers the current screen display to go back to a previous one. In another embodiment, the “back” button negates the user’s erroneous selection. The “music” button **248** activates a music menu, which allows the selection of an audio source (e.g., a song) to be added to a zone player’s music queue for playback.

The scroll wheel **250** is used for selecting an item within a list, whenever a list is presented on the screen **242**. When the items in the list are too many to be accommodated in one screen display, a scroll indicator such as a scroll bar or a scroll arrow is displayed beside the list. When the scroll indicator is displayed, a user may rotate the scroll wheel **250** to either choose a displayed item or display a hidden item in the list. The “ok” button **252** is used to confirm the user selection on the screen **242**.

There are three transport buttons **254**, which are used to control the effect of the currently playing song. For example, the functions of the transport buttons may include play/pause and forward/rewind a song, move forward to a next song track, or move backward to a previous track. According to one embodiment, pressing one of the volume control buttons such as the mute button **262** or the volume up/down button **264** activates a volume panel. In addition, there are three soft buttons **266** that can be activated in accordance with the labels **268** on the screen **242**. It can be understood that, in a multi-zone system, there may be multiple audio sources being played respectively in more than one zone players. The music transport functions described herein shall apply selectively to one of the sources when a corresponding one of the zone players or zone groups is selected.

FIG. 2C illustrates an internal functional block diagram of an exemplary controller **270**, which may correspond to the controller **240** of FIG. 2B. The screen **272** on the controller **270** may be a LCD screen. The screen **272** communicates with and is commanded by a screen driver **274** that is controlled by a microcontroller (e.g., a processor) **276**. The memory **282** may be loaded with one or more application modules **284** that can be executed by the microcontroller **276** with or without a user input via the user interface **278** to achieve desired tasks. In one embodiment, an application module is configured to facilitate grouping a number of selected zone players into a zone group and synchronizing the zone players for one audio source. In another embodiment, an application module is configured to control together the audio volumes of the zone players in a zone group. In operation, when the microcontroller **276** executes one of the application modules **284**, the screen driver **274** generates control signals to drive the screen **272** to display an application specific user interface accordingly, more of which will be described below.

The controller **270** includes a network interface **280** referred to as a RF interface **280** that facilitates wireless communication with a zone player via a corresponding RF interface thereof. In one embodiment, the commands such as volume control and audio playback synchronization are sent via the RF interfaces. In another embodiment, a saved zone group configuration is transmitted between a zone player and a controller via the RF interfaces. The controller **270** may control one or more zone players, such as **102**, **104** and **106** of FIG. 1. Nevertheless, there may be more than one controllers, each preferably in a zone (e.g., a room) and configured to control any one and all of the zone players.

In one embodiment, a user creates a zone group including at least two zone players from the controller **240** that sends signals or data to one of the zone players. As all the zone players are coupled on a network, the received signals in one zone player can cause other zone players in the group to be synchronized so that all the zone players in the group playback an identical audio source or a list of identical audio sources in a timely synchronized manner. Similarly, when a user increases the audio volume of the group from the controller, the signals or data of increasing the audio volume for the group are sent to one of the zone players and causes other zone players in the group to be increased together in volume and in scale.

According to one implementation, an application module is loaded in memory **282** for zone group management. When a predetermined key (e.g. the “zones” button **244**) is activated on the controller **240**, the application module is executed in the microcontroller **276**. The input interface **278** coupled to and controlled by the microcontroller **276** receives inputs from a user. A “Zone Menu” is then displayed on the screen **272**. The user may start grouping zone players into a zone group by activating a “Link Zones” or “Add Zone” soft button, or de-grouping a zone group by activating an “Unlink Zones” or “Drop Zone” button. The detail of the zone group manipulation will be further discussed below.

As described above, the input interface **278** includes a number of function buttons as well as a screen graphical user interface. It should be pointed out that the controller **240** in FIG. 2B is not the only controlling device that may practice the present invention. Other devices that provide the equivalent control functions (e.g., a computing device, a hand-held device) may also be configured to practice the present invention. In the above description, unless otherwise specifically described, it is clear that keys or buttons are

generally referred to as either the physical buttons or soft buttons, enabling a user to enter a command or data.

One mechanism for ‘joining’ zone players together for music playback is to link a number of zone players together to form a group. To link a number of zone players together, a user may manually link each zone player or room one after the other. For example, there is a multi-zone system that includes the following zones.

Bathroom
Bedroom
Den
Dining Room
Family Room
Foyer

If the user wishes to link 5 of the 6 zone players using the current mechanism, he/she must start with a single zone and then manually link each zone to that zone. This mechanism may be sometimes quite time consuming. According to one embodiment, a set of zones can be dynamically linked together using one command. Using what is referred to herein as a theme or a zone scene, zones can be configured in a particular scene (e.g., morning, afternoon, or garden), where a predefined zone grouping and setting of attributes for the grouping are automatically effectuated.

For instance, a “Morning” zone scene/configuration command would link the Bedroom, Den and Dining Room together in one action. Without this single command, the user would need to manually and individually link each zone. FIG. 3A provides an illustration of one zone scene, where the left column shows the starting zone grouping—all zones are separate, the column on the right shows the effects of grouping the zones to make a group of 3 zones named after “Morning”.

Expanding this idea further, a Zone Scene can be set to create multiple sets of linked zones. For example, a scene creates 3 separate groups of zones, the downstairs zones would be linked together, the upstairs zones would be linked together in their own group, and the outside zones (in this case the patio) would move into a group of its own.

In one embodiment as shown in FIG. 3B, a user defines multiple groups to be gathered at the same time. For example: an “Evening Scene” is desired to link the following zones:

Group 1
Bedroom
Den
Dining Room
Group 2
Garage
Garden

where Bathroom, Family Room and Foyer should be separated from any group if they were part of a group before the Zone Scene was invoked.

One of the important features, benefits and objects in the present invention is that that zones do not need to be separated before a zone scene is invoked. In one embodiment, a command is provided and links all zones in one step, if invoked. The command is in a form of a zone scene. After linking the appropriate zones, a zone scene command could apply the following attributes:

Set volumes levels in each zones (each zone can have a different volume)
Mute/Unmute zones.
Select and play specific music in the zones.
Set the play mode of the music (Shuffle, Repeat, Shuffle-repeat)

Set the music playback equalization of each zone (e.g., bass treble).

A further extension of this embodiment is to trigger a zone scene command as an alarm clock function. For instance the zone scene is set to apply at 8:00 am. It could link appropriate zones automatically, set specific music to play and then stop the music after a defined duration. Although a single zone may be assigned to an alarm, a scene set as an alarm clock provides a synchronized alarm, allowing any zones linked in the scene to play a predefined audio (e.g., a favorable song, a predefined playlist) at a specific time or for a specific duration. If, for any reason, the scheduled music failed to be played (e.g., an empty playlist, no connection to a share, failed UPnP, no Internet connection for an Internet Radio station), a backup buzzer will sound. This buzzer will be a sound file that is stored in a zone player.

FIG. 3C shows an exemplary user interface (UI) 330 to show all available individual zones in a house. Each zone player can play a type of media (such as music, photographs and video) independently. Each zone player in the UI may be highlighted on the screen using either a touch screen or an input device such as a stylus, a scroll wheel, or arrow buttons. If a user wishes to link players in some rooms together to form a group so that players in these rooms are playing the same media in a synchronized fashion, the user may activate the grouping function by activating “link zones” 332 that leads to a user interface 340 as shown in FIG. 3D.

The UI 340 shows that the zone players available for grouping are selectable. In one embodiment, the UI 340 is displayed (e.g., a touch screen) to allow the user to choose what zone players to be included in a group named after “Bedroom” so that they are all playing the same song “The Beatles”. It should be noted that the user may have an option to name the scene, for example, “afternoon”, or “light music”. In the example shown in FIGS. 3C and 3D, the user selects the Bedroom zone and then the “Link Zones” button 332, as a result, the default name for the scene being created is named after “Bedroom”. As shown FIG. 3D, a zone player may be selected or highlighted by “checking” it into the group. In another embodiment, the selection action could also be achieved through pressing the “+” icon next to each zone.

FIG. 3E shows a user interface 350 after the user has selected some of the available zone players into the scene. The display 350 is so displayed that a user can easily tell a group of linked players from the isolated players. According to one embodiment, a display may be provided to visually tell a user what have been grouped and what are not grouped. The display may even show various groups by size to indicate a number of zone players in each of the groups, for example, the larger a group appears, the more zone players there are in the group.

In general, all players in a group are caused to play the media being played in the first member used to form the group. In the case of FIG. 3E, the zone player in the bedroom is used to initiate the group or the first one in the group. At the time of forming the group, the zone player in the bedroom is playing “the Beatles”, as soon as a second zone player joins the group, the second zone player starts to be synchronized with the one already in the group and thus to play “the Beatles” in this case. As will be described below, the user now can switch the group of players to any other type of media or a different piece of music and all of the zone players in the group will play the selected media at the same time.

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FIG. 4 shows an exemplary user interface **400** that may be displayed on a controller **142** or a computer **110** of FIG. 1. The interface **400** shows a list of items that may be set up by a user to cause a scene to function at a specific time. In the embodiment shown in FIG. 4, the list of items includes "Alarm", "Time", "Zone", "Music", "Frequency" and "Alarm length". "Alarm" can be set on or off. When "Alarm" is set on, "Time" is a specific time to set off the alarm. "Zone" shows which zone players are being set to play a specified audio at the specific time. "Music" shows what to be played when the specific time arrives. "Frequency" allows the user to define a frequency of the alarm. "Alarm length" defines how long the audio is to be played. It should be noted that the user interface **400** is provided herein to show some of the functions associated with setting up an alarm. Depending on an exact implementation, other functions, such as time zone, daylight savings, time synchronization, and time/date format for display may also be provided without departing from the present invention.

According to one embodiment, each zone player in a scene may be set up for different alarms. For example, a "Morning" scene includes three zone players, each in a bedroom, a den, and a dining room. After selecting the scene, the user may set up an alarm for the scene as whole. As a result, each of the zone players will be activated at a specific time.

FIG. 5A shows a user interface **500** to allow a user to form a scene. The panel on the left shows the available zones in a household. The panel on the right shows the zones that have been selected and be grouped as part of this scene. Depending on an exact implementation of a user interface, Add/Remove buttons may be provided to move zones between the panels, or zones may be dragged along between panels.

FIG. 5B shows another user interface **520** to allow a user to form a scene. The user interface **520** that may be displayed on a controller or a computing device, lists available zones in a system. A checkbox is provided next to each of the zones so that a user may check in the zones to be associated with the scene.

FIG. 5C shows a user interface **510** to allow a user to adjust a volume level of the zone players in a zone scene individually or collectively. As shown in the user interface **510**, the 'Volumes . . . ' button (shown as sliders, other forms are possible) allows the user to affect the volumes of the associated zone players when a zone scene is invoked. In one embodiment, the zone players can be set to retain whatever volume that they currently have when the scene is invoked. Additionally the user can decide if the volumes should be unmuted or muted when the scene is invoked.

FIG. 6 shows a flowchart or process **600** of providing a player theme or a zone scene for a plurality of players, where one or more of the players are placed in a zone. The process **600** is presented in accordance with one embodiment of the present invention and may be implemented in a module to be located in the memory **282** of FIG. 2C.

The process **600** is initiated only when a user decides to proceed with a zone scene at **602**. The process **600** then moves to **604** where it allows a user to decide which zone players to be associated with the scene. For example, there are ten players in a household, and the scene is named after "Morning". The user may be given an interface to select four of the ten players to be associated with the scene. At **606**, the scene is saved. The scene may be saved in any one of the members in the scene. In the example of FIG. 1, the scene is saved in one of the zone players and displayed on the controller **142**. In operation, a set of data pertaining to the

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scene includes a plurality of parameters. In one embodiment, the parameters include, but may not be limited to, identifiers (e.g., IP address) of the associated players and a playlist. The parameters may also include volume/zone settings for the associated players in the scene. The user may go back to **602** to configure another scene if desired.

Given a saved scene, a user may activate the scene at any time or set up a timer to activate the scene at **610**. The process **600** can continue when a saved scene is activated at **610**. At **612**, upon the activation of a saved scene, the process **600** checks the status of the players associated with the scene. The status of the players means that each of the players shall be in condition to react in a synchronized manner. In one embodiment, the interconnections of the players are checked to make sure that the players communicate among themselves and/or with a controller if there is such a controller in the scene.

It is assumed that all players associated with the scene are in good condition. At **614**, commands are executed with the parameters (e.g., pertaining to a playlist and volumes). In one embodiment, data including the parameters is transported from a member (e.g., a controller) to other members in the scene so that the players are caused to synchronize an operation configured in the scene. The operation may cause all players to play back a song in identical or different volumes or to play back a pre-stored file.

One of the features, benefits and advantages in the present invention is to allow sets of related devices (controllers and operating components) to exist as a group without interfering with other components that are potentially visible on the same wired or wireless network. Each of the sets is configured to a theme or a scene.

FIGS. 7A and 7B illustrate a sequence of screens in accordance with one embodiment of the present invention for manipulating a plurality of zone players for an exemplary four-zone distributed audio system. There are four zone players in four zones and referred to as: "Zone 1", "Zone 2", "Zone 3" and "Zone 4".

FIG. 7A shows a grouping process. A first "Zone Menu" **702** shows a first list **703** of available zone players. One of the zone players or existing zone group is selected as a zone group head **704**, which is indicated with uniformly highlighted texts. It is noted the highlighted texts may also be expressed as grouped icons, concatenated texts or other representations of a current selection on the screen. The highlighted texts react to a user's scrolling selection (e.g., via a scroll wheel **250** of FIG. 2B). Also shown as one of the bottom labels on the first "Zone Menu" **702** is the "Link Zones" or "Add Zone" label **706** that corresponds to a soft button (e.g., soft button **266** of FIG. 2B). A scroll indicator is displayed beside the first display **702** when the number of items is too many to be accommodated in one display.

When the soft button corresponding to "Link Zones" or "Add Zone" **706** is activated, a second "Zone Menu" **708** is displayed. A second list shows eligible zone groups or zone players **709** for the zone group head **704**. Since "Zone 2" has been selected as the zone group head to form a zone group, the eligible zone groups and zone players are now "Zone 1", "Zone 3" and "Zone 4". As shown as highlighted texts, the zone player (Zone 4) **710** is selected to be grouped with the zone group head (Zone 2) **704** to form a new zone group.

After the user confirms the selection, the newly formed zone group configuration is updated and the audio source can be played synchronously for all of the zone players in the newly formed zone group as shown in FIG. 7A. The first "Zone menu" **712** is displayed again with the newly formed zone group **714** as one of the choices along with other

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available zone players. Depending on implementation, any zone players that have been used in a group may or may not be used in another group. As shown in FIG. 7A, the zone players 2 and 4 are in a zone group started by the zone player 2, the zone player 4 (even the zone player 2) can be in

another zone group, for example, while a player in a living room is grouped with a player in a dining room, the same player in the living room can be grouped with a player in a family room.

In another embodiment, a display shows a list of available zone players for grouping. An interactive graphic interface allows a user to interactively select some of the available zone players that are automatically grouped. Anyone of the selected zone players in the group may be elected to be a group head such that other players in the group are synchronized to follow the group head.

According to one embodiment, the synchronization of all zone players in the new zone group is achieved with the following steps: 1) choosing an audio source from one of the zone players in the group, 2) checking if the chosen audio source is available locally on each of the zone players, 3) retrieving the audio source from another device (e.g., other zone players) which has the audio source via the data network, if the audio source is not available locally, and 4) playing the audio source on each of the zone players synchronously. In another embodiment, the audio source in the group or player to be added is chosen as default for other zone players. As shown in FIG. 7A, the audio source for "Zone 4" is track 10 with artist D. Accordingly, the zone player "Zone 2" will play track 10 with artist D synchronously with "Zone 4" after the new zone group is formed.

FIG. 7B shows a de-grouping process in reference to FIG. 7A. A first "Zone Menu" 722 shows a first list 723 of available zone players and zone groups, if there is any. One of the zone groups ("Zone 2+Zone 4") to be de-grouped is selected as shown in highlight texts 724. When the "Unlink Zones" or "Drop Zone" soft button 726 is activated, the second "Zone Menu" 728 displays a list 729 that shows all of the member zone players in the selected zone group. One of the zone players 730 (Zone 4) in the selected zone group is chosen to be disassociated from the zone group 724. When the de-grouping is confirmed by user, the "Zone Menu" 732 is presented to reflect the de-grouping of a zone group (e.g., "Zone 2") 734. When zone players are grouped together, all of the zone players play the same audio source synchronously. If a zone player is disassociated or dropped from the zone group, the remaining zone players in the zone group continue playing the audio source. In the "Zone Menu" 732, it shows the zone player (Zone 4) has no music 736 after the disassociation from the zone group, while the remaining player (Zone 2) continues to play the same music—track 10 with artist D.

Referring now to FIG. 7C, there shows a sequence of screens depicting alternative steps of creating a zone group. An exemplary five-zone audio system is used to describe these alternative steps. There are five zone players located in a living room, a dining room, a kitchen, an office and a master bedroom. It is assumed that three of the five rooms, the living room, the dining room and the kitchen, are grouped to form a zone group called "LivingRoom+DiningRoom+Kitchen". The Screen display 750 shows that an audio source called "Counting Crows" 752 is being played on all the zone players in the group. When a user activates the "music" button 248 on a controller 240 of FIG. 2B, the screen display 760 shows a "Music Menu" page which shows a list of choices 762. One of the choices is "Play Music From Other Rooms" 764. When the user selects this

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option, the screen display 770 for "Play Same Music As Other Rooms" displays a list 772 of eligible rooms or zone players to be grouped with the current group "Living Room+Dining Room+Kitchen". In this example the eligible rooms are Office 774 and Master Bedroom 776. It is assumed that the "Office" 774 which is indicated with the highlighted bar is chosen. As a result, the zone player "Office" is grouped with the original zone group to become a new group called "LivingRoom+DiningRoom+Kitchen+Office" as shown in screen display 780. And the audio source "Miles Davis" 782 from the zone player "Office" is played synchronously on all zone players in the new group.

Referring now to FIGS. 8A and 8B, there is shown a sequence of screens in accordance with one embodiment of the present invention for controlling audio volume of zone players in a zone group. These screens are activated and displayed when one of the volume control buttons is activated. According to one embodiment, the volume control buttons are "mute" button 262 and "volume up/down" button 264 on the controller 240 of FIG. 2B.

FIG. 8A shows that the current active zone player is in a living room of a house. The "Volume" panel 810 is displayed for the current zone player "Living Room". A volume meter 812 is included to indicate a volume adjustment made by a user. A mute icon 814 is shown when the "mute" button is activated while the audio is on.

FIG. 8B shows that the current active zone group includes five rooms: living room, dining room, kitchen, den and study. A "Volume" panel 830 for the zone group is displayed for the convenience of a user. In the display, a plurality of volume meters 831 is shown. One of the volume meters is for the entire zone group 832. Other volume meters are for all the zone players in the group, one for each room or zone player. A scroll indicator is shown as a downward arrow 836 that indicates the screen is too small to hold all volume meters in one screen display. There are more hidden choices that can be viewed by scrolling down. The scrolling cursor 836 is highlighted (e.g., Den 834). As a user scrolls down the list of volume meters 831, the contents on "Volume" panel 840 includes the volume meter of the next zone player on the list (e.g., Study 844). Similarly, when the scroll indicator is an upward arrow 842, other hidden choices within the list can be viewed by scrolling up.

When a user adjusts the audio volume, only the highlighted zones or zone players are affected. If the highlighted selection is one zone player, the audio adjustment will only apply to that particular chosen player. If multiple zone players are selected, the adjustment applies to all of the chosen players similar to the volume adjustment to the group volume meter described below. The audio volume of all zone players in the zone group will be affected, if the highlighted selection is at the volume meter of the entire group 832. Any audio volume adjustment to the zone group applies to all of the zone players equally within the entire zone group. Depending on implementation, the relative difference of the audio volume among zone players in the group remains unchanged either in percentage or graphic strength.

FIG. 9 shows a flowchart or process 900 of implementing one embodiment of the present invention for manipulating zone players. The process 900, which is preferably understood in conjunction with the previous figures especially with FIGS. 2B, 2C, 7A and 7B, may be implemented in software, hardware, or a combination of both. According to one embodiment, an application module implementing the process 900 is embedded in a controller, for example, the device 240 of FIG. 2C. The module may be loaded in the

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memory 282 to be executed by the microcontroller (processor) 276 and operating in conjunction with user input commands via the input interface 278.

The process 900 starts with a display at 902 showing a list of zone players or existing zone groups, if there are any. When the available zone players and zone groups in the list is too long to be presented on the display, a scroll indicator will be displayed beside the list. A user may access the hidden items within the list by scrolling either upward or downward. At 903, the process 900 splits into two branches based on the following tasks: 1) grouping a plurality of zone players to form a zone group, or 2) de-grouping a zone group.

If the process 900 performs the grouping task, the process moves onto 904. The user selects one of the zone players as a zone group head or the zone groups from the list. Once the selection is made and a key is activated (e.g., a soft button 706 as shown in FIG. 7A), a new list (e.g., screen 708 as shown in FIG. 7A) showing all of the zone players and zone groups that are eligible to be grouped with the selection at 904 is displayed at 908. In one embodiment as shown in FIG. 7A, when the zone player "Zone 2" is selected as the zone group head in a four-zone audio system, the eligible zone players are all other zone players ("Zone 1", "Zone 3" and "Zone 4") except for the zone player "Zone 2". At 910, the end user is then given the option to select one or more of the eligible zone players (e.g., "Zone 4" in FIG. 7A) or one of the eligible zone groups to be grouped into the selection at 904.

At 912, the user has the option to confirm to accept or to discard the selection made at 910. When a confirmation is made, the process 900 creates the zone group by synchronizing all of the zone players in the zone group at 914. In one embodiment, the synchronization is performed first to determine the audio source in the selected player to be grouped (e.g., Zone 4 in FIG. 7A). Then the audio source is transmitted to all other zone players in the same zone group before playing the audio source synchronously. In the meantime, this newly formed zone group configuration is updated. For example, the zone group configuration is saved to the memory 206 on the zone player 200 of FIG. 2A via the wireless communication. After the zone player in the newly formed zone group has been synchronized, the process 900 moves back to 902. An updated list of available zone players and zone groups is displayed. As an example shown in "Zone Menu" 712 of FIG. 7A, the newly formed zone group is listed as one of the items.

Going back to 912, if the selection made at 910 can not be confirmed or is to be discarded, the process 900 goes back to 902 without updating any zone group configuration. In this case, the original list is intact (e.g., "Zone Menu" 702 of FIG. 7A).

Going back to the grouping task test at 903, when the process 900 performs the de-grouping task, the process 900 moves to 924. A user selects one zone group from the first list. Once the selection is made, a list (e.g., screen 728 as shown in FIG. 7B) showing all of the zone players in the selected zone group is displayed at 928. In one embodiment as shown in FIG. 7B, "Zone 2+Zone 4" is the selected zone group, the zone players in the selected zone group are "Zone 2" and "Zone 4". At 930, the end user selects one or more of the zone players (e.g., Zone 4) from the list to be disassociated from the zone group. At 932, the user has the option to confirm or to discard the selection made at 930.

When the selection is confirmed, the process 900 updates the selected zone group by disassociating the zone player from the zone group at 934. As a result of the disassociation,

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the audio source being played in the zone group is no longer available to the disassociated zone player. In the meantime, the updated zone group configuration is saved. For example, the zone configuration is saved to the memory 206 on the zone player 200 (FIG. 2A). After the zone player has been disassociated, the process 900 moves back to 902. The list of available zone players and zone groups is displayed. This time the newly updated zone group is listed as one of the items (e.g., "Zone Menu" 732 of FIG. 7B).

Going back to 932, if the selection made at 930 is to be discarded, the process 900 moves back to 902 directly without updating the zone group configuration. In this case, the original list is presented (e.g., "Zone Menu" 722 of FIG. 7B).

Referring now to FIG. 10, there is shown a flowchart or process 1000 of controlling audio volume of a plurality of zone players in a zone group. The process 1000, which is preferably understood in conjunction with the previous figures especially with FIGS. 2B, 2C, 8A and 8B, may be implemented in software, hardware, or a combination of both. According to one embodiment, an application module implementing the process 1000 is embedded in a controller, for example, the device 240 of FIG. 2C. The module may be loaded in the memory 282 to be executed by the microcontroller (processor) 276 and operating in conjunction with user input commands. In one embodiment, the module is configured to control the audio volume of a group of zone players. It should be noted that zone group and a group of zone players are used interchangeably in the description for FIG. 10.

At 1005, the process 1000 starts when one of the volume control buttons, for example, "mute" button 262 or "volume up/down" button 264, on the controller 240 of FIG. 2B, is activated. The process 1000 splits into two branches depending on whether a single zone player or a group of zone players is to be controlled at 1010.

If it is for a single zone player, a volume meter (e.g., "Volume" panel 810 in FIG. 8A) is presented at 1012. At 1014, the end user has option to adjust the volume for the zone player with one of the volume control buttons. The volume control signals are sent from the controller 240 (FIG. 2C) to the zone player 200 (FIG. 2A). In one embodiment, the volume panel displays a moving volume meter showing an increasing or decreasing bar as the audio volume of the selected zone player is adjusted up or down. In another embodiment, the mute icon is shown instead of a volume meter, when the "mute" button is activated while the audio is on.

At 1016, the process 1000 is waiting for a user's command. If a predetermined amount of time (e.g., 1 second) has lapsed, the process 1000 ends, which means the user is not going to change the volume. Otherwise, the process 1000 goes back to 1012 waiting for another action from the end user.

Referring back to 1010, if process 1000 is for a group of zone players, then the process 1000 moves to the zone group branch at 1022, in which a plurality of volume meters is presented. The plurality of volume meters includes one for each of the zone players in the zone group, plus one more for the entire zone group. In one embodiment as shown in FIG. 8B, a "Volume" panel 830 for a plurality of zone players in a zone group is presented. When the screen is too small to display all the zone players, a scroll indicator is displayed beside the list of the volume meters to indicate that there are hidden volume meters. At 1024, the user selects one of the volume meters. At 1026, the audio volume is adjusted with one of the volume control buttons. When the volume adjust-

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ment is made to one of the zone players, only the selected zone player is affected. The audio volume of the rest of the zone players remains unchanged. However, when the volume adjustment is made to the zone group, the entire group will respond to the volume adjustment in an identical scale. In one embodiment, the identical scale is based on percentage of the audio volume. In another embodiment, the identical scale is based on graphic representation of the volume meter.

In one embodiment, an end user increases the audio volume for the zone group by 5%. The volume for each of the zone players in the zone group will be increased by 5%, and the relative volume loudness difference among each of the zone players remains unchanged. In another embodiment, if a user had muted one of the zone players of the zone group, the volume of all other zone players would have been unchanged.

The group audio volume is calculated based on a predetermined formula. In one embodiment, the group audio volume is the averaged value of the audio volume of all the zone players within the zone group. In another embodiment, the median value may be chosen as the group audio volume. The user uses a scrolling device (e.g., scroll wheel **250** of FIG. **2B**) to select a zone player or the entire zone group and then adjust the volume with one of the volume control buttons.

At **1028**, the process **1000** is waiting for a user's command. If a predetermined amount of time has lapsed, the process **1000** ends, which means the user is not going to change the volume of the zone group. Otherwise, the process **1000** goes back to **1022** waiting for another action from the end user.

FIGS. **11A-11D** are a series of screenshots according to one embodiment of the present invention on a computing device on a network. The computing device may correspond to the device **110** of FIG. **1** and be configured to control operations of the zone players installed in a complex. With a larger screen of the computing device than that of a portable controller, the graphic user interface on the larger screen appears different from that, for example, shown in FIGS. **7A-7B**, the underlying principle nevertheless does not depart from the above description for the portable controller. A user is able to control any one or all of the zone players from the computing device. FIG. **11A** shows all individual available zone players with the one in the Dining Room being selected to play a track entitled "A Charlie Brown Christmas". FIG. **11B** shows a pop-up window listing remaining available players to be grouped with the one in the Dining Room. Depending on a desirable group, the user can select from the remaining available players to be grouped with the one in the Dining Room to form a zone group. FIG. **11C** shows, as a result, the players in the Dining Room and the living room are in one group and play synchronously a song entitled "Christmas time is here". FIG. **11D** shows the control of some exemplary acoustic characteristics of the zone players in a group with the volume being controlled.

The present invention can be implemented in many ways, each of which may yield one or more of the following benefits, advantages or features. One of them is a mechanism provided to enable a user to remotely control audio characteristics of the zone players either as a group or as an individual player. Second, an interactive graphic user interface is provided to enable a user to manage, create, delete or modify zone groups. Another one of the benefits, advantages or features is to provide a user interface to facilitate a user to control audio characteristics of an individual zone player or a group of zone players. Other benefits, advantages or

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features can be appreciated by those skilled in the art given the detailed description herein.

The present invention has been described in sufficient detail with a certain degree of particularity. It is understood to those skilled in the art that the present disclosure of embodiments has been made by way of examples only and that numerous changes in the arrangement and combination of parts may be resorted without departing from the spirit and scope of the invention as claimed. While the embodiments discussed herein may appear to include some limitations as to the presentation of the information units, in terms of the format and arrangement, the invention has applicability well beyond such embodiment, which can be appreciated by those skilled in the art. Accordingly, the scope of the present invention is defined by the appended claims rather than the forgoing description of embodiments.

The invention claimed is:

1. A computing device comprising:

one or more processors; and

tangible, non-transitory computer-readable memory having stored thereon instructions, wherein the instructions, when executed by the one or more processors cause the computing device to perform functions comprising:

displaying on a first user interface, a first plurality of graphical representations, wherein a first graphical representation of the first plurality of graphical representations corresponds to a first zone in a media playback system, and wherein a second graphical representation of the first plurality of graphical representations corresponds to a second zone in the media playback system; receiving via the first user interface, an input to create a zone group comprising the first zone and the second zone;

after receiving the input to create the zone group comprising the first zone and the second zone, displaying on a second user interface, a second plurality of graphical representations, wherein a first graphical representation of the second plurality of graphical representations corresponds to the first zone, wherein a second graphical representation of the second plurality of graphical representations corresponds to the second zone, and wherein a third graphical representation of the second plurality of graphical representations corresponds to the zone group;

receiving via the second user interface, an input to cause the zone group to play audio content;

in response to the input to cause the zone group to play audio content, transmitting to at least one of the first and second zones, a command to play audio content as the zone group; and

changing both a first volume setting of the first zone to a second volume setting of the first zone and a first volume setting of the second zone to a second volume setting of the second zone by adjusting a group volume control representation, wherein a value of the group volume control representation always corresponds to an average of the first volume setting and the second volume setting.

2. The computing device of claim **1**, wherein receiving via the first user interface, the input to create a zone group comprising the first zone and the second zone comprises:

receiving via the first user interface, an input to create a zone group; and

after receiving the input to create the zone group, receiving input indicating (i) a selection of the first zone and (ii) a selection of the second zone.

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3. The computing device of claim 1, wherein receiving via the second user interface, the input to cause the zone group to play audio content comprises:

receiving via the second user interface, an input to play the audio content; and

after receiving the input to play the audio content, receiving an input indicating a selection of the third graphical representation of the second plurality of graphical representations.

4. The computing device of claim 1, wherein receiving via the second user interface, the input to cause the zone group to play audio content comprises:

receiving via the second user interface, an input indicating a selection of the third graphical representation of the second plurality of graphical representations; and

after receiving the input indicating the selection of the third graphical representation, receiving an input to play audio content.

5. The computing device of claim 1, wherein the command to play audio content as the zone group comprises a command to cause at least the first and second zones to play the audio content in synchrony.

6. The computing device of claim 1, wherein transmitting to at least one of the first and second zones, a command to play audio content as the zone group comprises:

transmitting to at least one of the first and second zones, a network address from which the audio content can be received.

7. The computing device of claim 1, wherein the functions further comprise:

after receiving via the first user interface, the input to create a zone group comprising the first zone and the second zone, transmitting to a first computing device of two or more computing devices in the zone group, a command to become a zone group head of the two or more computing devices in the zone group.

8. A tangible, non-transitory computer-readable medium having instructions stored thereon, wherein the instructions, when executed by one or more processors, cause a computing device to perform functions comprising:

displaying on a first user interface, a first plurality of graphical representations, wherein a first graphical representation of the first plurality of graphical representations corresponds to a first zone in a media playback system, and wherein a second graphical representation of the first plurality of graphical representations corresponds to a second zone in the media playback system;

receiving via the first user interface, an input to create a zone group comprising the first zone and the second zone;

after receiving the input to create the zone group comprising the first zone and the second zone, displaying on a second user interface, a second plurality of graphical representations, wherein a first graphical representation of the second plurality of graphical representations corresponds to the first zone, wherein a second graphical representation of the second plurality of graphical representations corresponds to the second zone, and wherein a third graphical representation of the second plurality of graphical representations corresponds to the zone group; receiving via the second user interface, an input to cause the zone group to play audio content;

in response to the input to cause the zone group to play audio content, transmitting to at least one of the first and second zones, a command to play audio content as the zone group; and

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changing both a first volume setting of the first zone to a second volume setting of the first zone and a first volume setting of the second zone to a second volume setting of the second zone by adjusting a group volume control representation, wherein a value of the group volume control representation always corresponds to an average of the first volume setting and the second volume setting.

9. The tangible, non-transitory computer-readable medium of claim 8, wherein receiving via the first user interface, the input to create a zone group comprising the first zone and the second zone comprises:

receiving via the first user interface, an input to create a zone group; and after receiving the input to create the zone group, receiving input indicating (i) a selection of the first zone and (ii) a selection of the second zone.

10. The tangible, non-transitory computer-readable medium of claim 8, wherein receiving via the second user interface, the input to cause the zone group to play audio content comprises:

receiving via the second user interface, an input to play the audio content; and

after receiving the input to play the audio content, receiving an input indicating a selection of the third graphical representation of the second plurality of graphical representations.

11. The tangible, non-transitory computer-readable medium of claim 8, wherein receiving via the second user interface, the input to cause the zone group to play audio content comprises:

receiving via the second user interface, an input indicating a selection of the third graphical representation of the second plurality of graphical representations; and

after receiving the input indicating the selection of the third graphical representation, receiving an input to play audio content.

12. The tangible, non-transitory computer-readable medium of claim 8, wherein the command to play audio content as the zone group comprises a command to cause at least the first and second zones to play the audio content in synchrony.

13. The tangible, non-transitory computer-readable medium of claim 8, wherein transmitting to at least one of the first and second zones, a command to play audio content as the zone group comprises:

transmitting to at least one of the first and second zones, a network address from which the audio content can be received.

14. The tangible, non-transitory computer-readable medium of claim 8, wherein the functions further comprise:

after receiving via the first user interface, the input to create a zone group comprising the first zone and the second zone, transmitting to a first computing device of two or more computing devices in the zone group, a command to become a zone group head of the two or more computing devices in the zone group.

15. A method comprising:

displaying by a computing device on a first user interface, a first plurality of graphical representations, wherein a first graphical representation of the first plurality of graphical representations corresponds to a first zone in a media playback system, and wherein a second graphical representation of the first plurality of graphical representations corresponds to a second zone in the media playback system; receiving by the computing

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device via the first user interface, an input to create a zone group comprising the first zone and the second zone;

after receiving the input to create the zone group comprising the first zone and the second zone, displaying by the computing device on a second user interface, a second plurality of graphical representations, wherein a first graphical representation of the second plurality of graphical representations corresponds to the first zone, wherein a second graphical representation of the second plurality of graphical representations corresponds to the second zone, and wherein a third graphical representation of the second plurality of graphical representations corresponds to the zone group;

receiving by the computing device via the second user interface, an input to cause the zone group to play audio content;

in response to the input to cause the zone group to play audio content, transmitting by the computing device to at least one of the first and second zones, a command to play audio content as the zone group; and

changing both a first volume setting of the first zone to a second volume setting of the first zone and a first volume setting of the second zone to a second volume setting of the second zone by adjusting a group volume control representation, wherein a value of the group volume control representation always corresponds to an average of the first volume setting and the second volume setting.

16. The method of claim 15, wherein receiving by the computing device via the first user interface, the input to create a zone group comprising the first zone and the second zone comprises: receiving by the computing device via the first user interface, an input to create a zone group; and

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after receiving the input to create the zone group, receiving by the computing device, input indicating (i) a selection of the first zone and (ii) a selection of the second zone.

17. The method of claim 15, wherein receiving by the computing device via the second user interface, the input to cause the zone group to play audio content comprises:

receiving by the computing device via the second user interface, an input to play the audio content; and

after receiving the input to play the audio content, receiving by the computing device, an input indicating a selection of the third graphical representation of the second plurality of graphical representations.

18. The method of claim 15, wherein receiving by the computing device via the second user interface, the input to cause the zone group to play audio content comprises:

receiving via the second user interface, an input indicating a selection of the third graphical representation of the second plurality of graphical representations; and

after receiving the input indicating the selection of the third graphical representation, receiving an input to play audio content.

19. The method of claim 15, wherein the command to play audio content as the zone group comprises a command to cause at least the first and second zones to play the audio content in synchrony.

20. The method of claim 15, wherein transmitting by the computing device to at least one of the first and second zones, a command to play audio content as the zone group comprises:

transmitting by the computing device to at least one of the first and second zones, a network address from which the audio content can be received.

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